
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 1 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

TABLE OF CONTENTS

<u>Section</u>	<u>page no.</u>
1. OBJECTIVE	1
2. SCOPE	2
3. DRAWINGS AND APPLICABLE DOCUMENTS	4
4. GENERAL CUSTOMER INFORMATION	4
4.1 PRODUCT APPLICATION.....	4
4.2 COMPATIBILITY	6
4.3. MATING ALIGNMENT.....	8
4.4 VOLTAGE RATING:.....	9
4.5 CURRENT RATING	11
4.6. MECHANICAL PROPERTIES	21
4.7. SAFETY.....	21
5. REQUIREMENT FOR CUSTOMERS PCB	23
5.1. TAIL LENGTH.....	24
5.2. PCB ALIGNMENT	24
6. APPLICATION TOOLING	25
6.1. RIGHT ANGLE HEADER (STB).....	25
6.2. RIGHT ANGLE RECEPTACLE (STB).....	25
6.3. HOLD DOWN CLIP / APPLICATION INSPECTION REQUIREMENTS	26
6.4. VERTICAL RECEPTACLE (6.0 mm Pitch- Press-Fit).....	26
6.5 HCI HIGH POWER MODULE CONNECTOR (7.3 mm Pitch - Press-Fit)	22
7. REVISION RECORD	28

1. **OBJECTIVE**

This specification provides information and requirements for customer application of the HCI Power Connector Co-planar and Back-plane system. It is intended to provide general guidance for process development. It should be recognized that no single process will work under all customer applications and that customers should develop processes to meet individual needs. However, if the processes vary greatly from the recommended one, FCI cannot guarantee acceptable results.

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 2 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

2. SCOPE

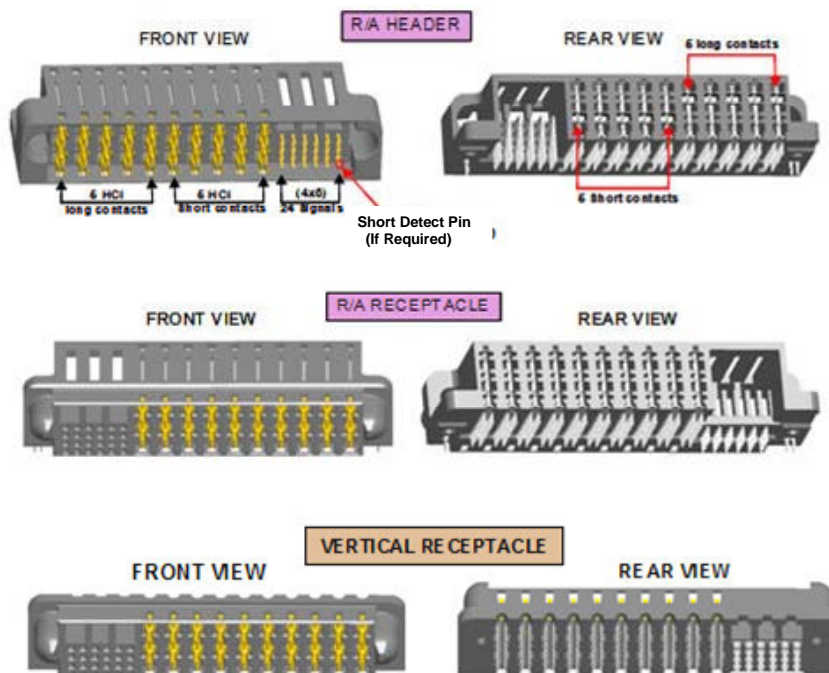
This specification provides information and requirements regarding application of HCI Power Connector to printed circuit boards (PCB).


TABLE 1

HCI Configuration With Integrated Guidance	Right Angle Header, Solder Tail
	Right Angle Receptacle, Solder Tail
	Vertical Receptacle, Press-Fit Tail
HCI High Power Module	Right Angle Header, Press-Fit Tail
	Vertical Receptacle, Press-Fit Tail

FIGURE 1

HCI Connector System (10DC-24S Configuration)



	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE <h1 style="text-align: center;">HCI[®]</h1> <h2 style="text-align: center;">Power Connector System</h2>		PAGE 3 of 28	REVISION C
CLASSIFICATION UNRESTRICTED		AUTHORIZED BY H. Zhang	DATE Nov 22 2011

HCI HIGH POWER MODULE CONFIGURATION

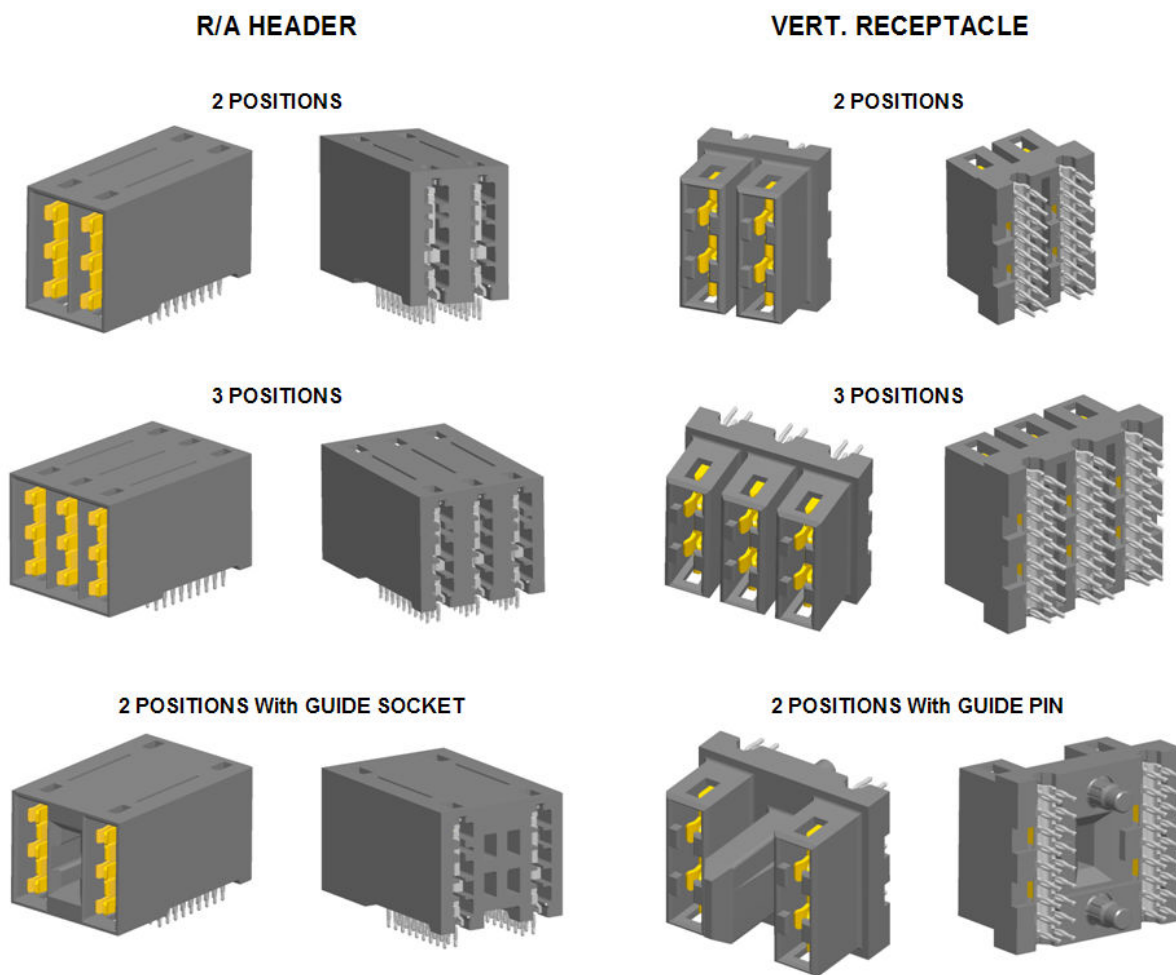



FIGURE 2

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE HCI[®] Power Connector System		PAGE 4 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

3. DRAWINGS AND APPLICABLE DOCUMENTS

- FCI Product Specification GS-12-380 (HCI Power Connector system)
- Applicable FCI Product Drawings
- IEC 664-1: Insulation Coordination for Equipment with Low-Voltage Systems
- IEC 61984: Connectors - Safety Requirements and Tests
- UL 60950 (supercedes UL 1950): Safety of Information Technology Equipment
- IEC 60950-1*: Information Technology Equipment – Safety, Part 1: General Requirements
- TUV Specification: IEC 60664-1 (Up to 50V products)
IEC 61984 (50V and above up to 1000V products)

***EC 60950-1 contains the same information as UL 60950**

FCI product drawings and specifications are available by accessing the FCI website or contacting the FCI Technical Service. In the event of a conflict between this specification and the product drawing, the drawing takes precedence. Customers should refer to the latest revision level of FCI product drawings for appropriate product details.

4. GENERAL CUSTOMER INFORMATION

This document is a general application guide. If there is a conflict between the product drawings and this specification, the drawings take precedence.

4.1 PRODUCT APPLICATION


	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE HCI[®] Power Connector System		PAGE 5 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

FIGURE 3

(Coplanar System) Exploded View

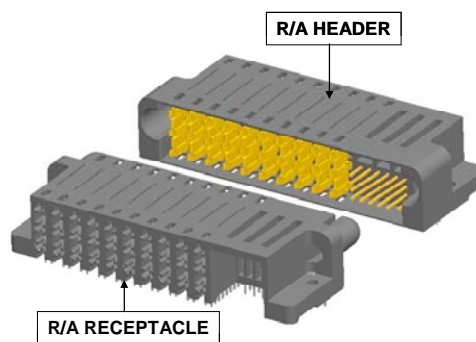
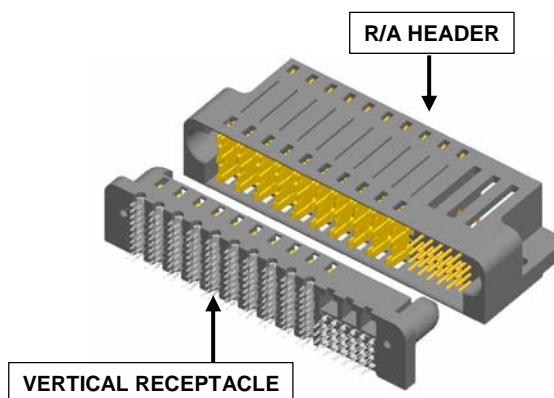


FIGURE 4

(Back-Plane System) Exploded View




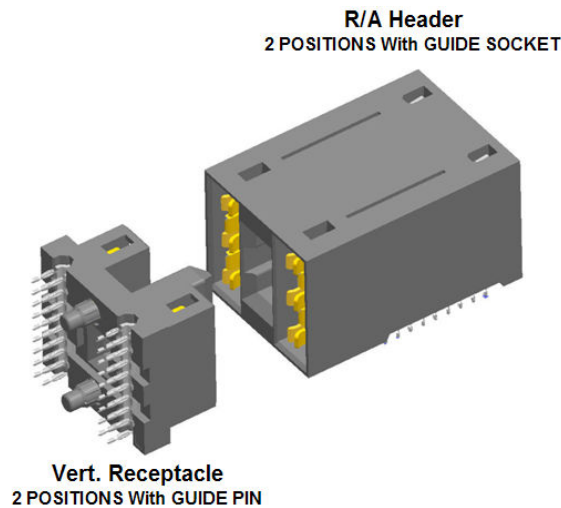
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE <h1 style="text-align: center;">HCI[®]</h1> <h2 style="text-align: center;">Power Connector System</h2>		PAGE 6 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

FIGURE 5



HCI has two options for connection to Printed Circuit Boards -- Press Fit and Solder to Board. The HCI Solder to Board Power and Signal contacts are compatible with several soldering process, including wave soldering. They are versatile with many configurations to fit the individual needs of the client and are less expensive than press-fit.


4.2 COMPATIBILITY

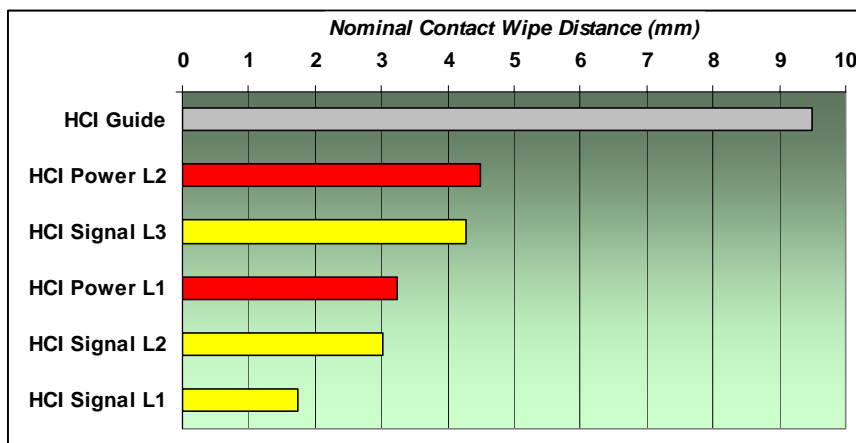
4.2.1 HCI Hard Metric product compatibility

HCI High Power Module Connectors are compatible with hard metric products such as Metral, AirMax VS, Zipline and XCede high speed connector system. The distance between backplane and front edge of the daughter card is 12.5mm.

4.2.2 HCI contact sequencing compatibility.

There are two available mating lengths and associated wipe distances, which are controlled by changing the Header contact length. The contact sequencing of the power and signal are compatible with the Power Blade contact, the Metral, AirMax VS[®], Zipline, and XCede High speed connector system.

	TYPE	APPLICATION SPECIFICATION		NUMBER	GS-20-070		
	<p style="text-align: center;">HCI® Power Connector System</p>				PAGE	7 of 28	REVISION
AUTHORIZED BY					DATE		
				H. Zhang		Nov 22 2011	
				CLASSIFICATION			
				UNRESTRICTED			



Note:

- HCI Signal L2 would be used as Short Detect Pin if there are only 2 levels of Signal
- HCI Signal L1 would be used as Short Detect Pin if there are 3 levels of Signal


Power Contact	Signal Contact	Minimum Wipe Distance (mm)	Remark
LONG (L2)		4.378	Standard
SHORT(L1)		3.108	Standard
	LONG (L3)	3.940	Standard
	SHORT (L2)	2.670	Standard / Detected Pin
	SHORT (L1)	1.400	Special

Note: Wipe distance has not included the Tolerance of Board to Board Distance.

TABLE 3

4.2.3 Lead-free Processing

HCI Power Connector System is compatible with standard lead-free processing, including convection, infra-red, and vapor-phase reflow, and will withstand peak processing temperatures of 260°C for a period of 60 seconds without affecting form, fit, or function.

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE HCI[®] Power Connector System		PAGE 8 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

4.3. MATING ALIGNMENT

4.3.1 Under 100 mm connector length (HCI general product / X Direction)

The guiding system of the HCI Power Connector System allows Maximum misalignment 2.54 mm on X and 4.00 mm on Y direction. The angle misalignment between board-edge to board-edge allows 4 degree.

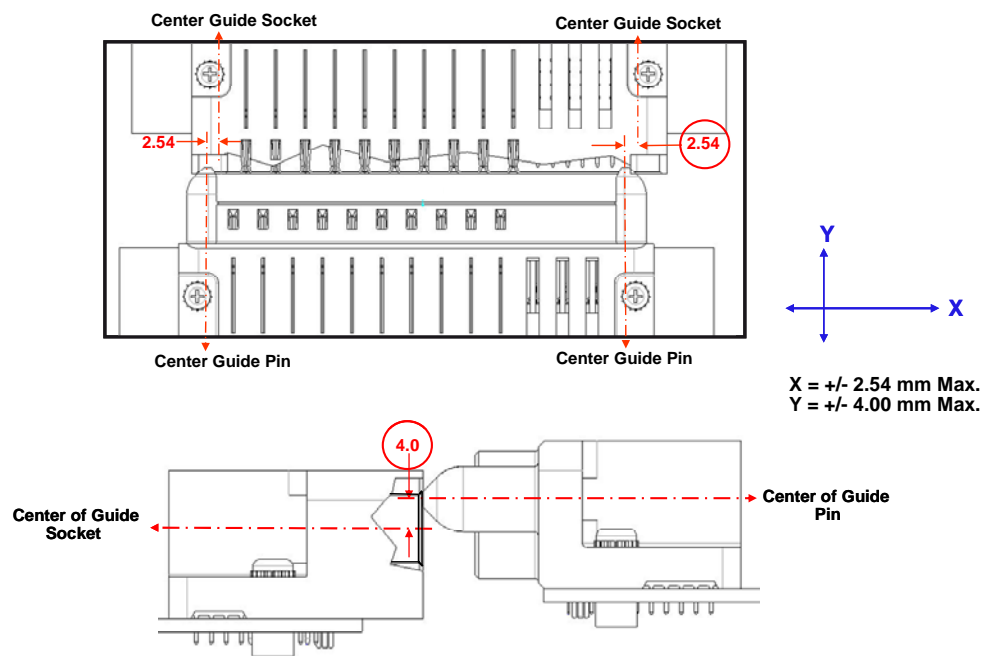

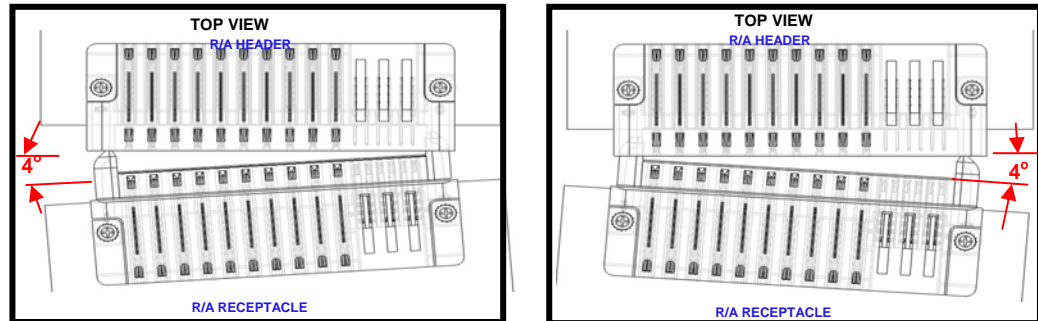


FIGURE 6

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE <h1>HCI[®]</h1> <h2>Power Connector System</h2>	PAGE 9 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			



SUMMARY: Misalignment allowance:

X = +/- 2.54 mm (.100") Max.
 Y = +/- 4.00 mm (.157") Max.
 Angle = +/- 4 deg. Max.

FIGURE 7

4.3.2 HCI High Power Module

The HCI High Power Module with integrated guide will correct a maximum misalignment of **+/- 2.9 mm** in the direction perpendicular to the daughter card and **+/- 2.9 mm** in the direction parallel to the daughter card. The nominal wipe distance after it has been fully guided is **10.9 mm**. After fully guided the clearance between the guide pin and guide socket is **0.25 mm** in the direction perpendicular to the daughter card and **0.25 mm** in the direction parallel to the daughter card.

The plastic guide system of this product is intended to provide daughter card alignment with respect to the backplane or midplane. However factors such as daughter card size and weight, the overall system guide design, etc should be considered when deciding whether additional external guide hardware is needed.

4.4 VOLTAGE RATING:

The follow parameters are the recommended Maximum Working Voltage versus minimum creepage distance (MCD) of the HCI Power connector system are rated based on the UL 60950-1 Edition 2, Table 2N.

- Pollution Degree: **2** (representative of a typical office environment for electrical connectors)
- Material Group: **1** (The Comparative Tracking Index (CTI) of the housing material is greater than 600 based on UL rated.)


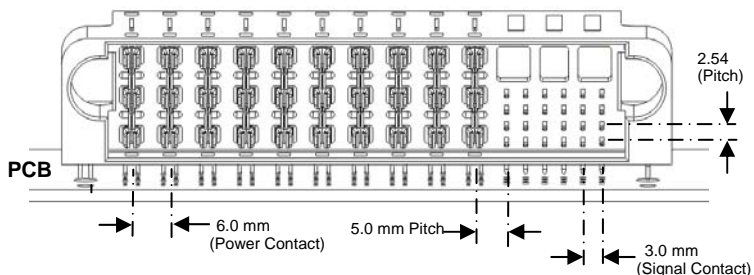

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 10 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

FIGURE 8



The Maximum Working Voltage are recommended (RMS Voltage)			
UL-60950-1 Edition 2 Table 2N			
Pollution Degree: 2 Material group: 1			
Contact Pitch (mm / inch)		MCD (mm)	RMS Working Voltage
Power to Power	6.00 mm (0.236")	2.512	502
	7.30 mm (0.287")	3.812	760
	7.62 mm (0.300")	4.132	826
	14.60 mm (0.575")	11.11	2,222
Power to Signal	5.00 mm (0.197")	2.393	479
Power to Signal	7.62 mm (0.300")	5.013	1003
Power to Signal	2.54 mm (0.100")	0.813	163

TABLE 4

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI® Power Connector System	PAGE 11 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			


4.5 CURRENT RATING

(Refer to FCI Product Specification GS-12-380 for additional information)

Following are the current rating values for the HCI Power Connector System in two different test configurations:

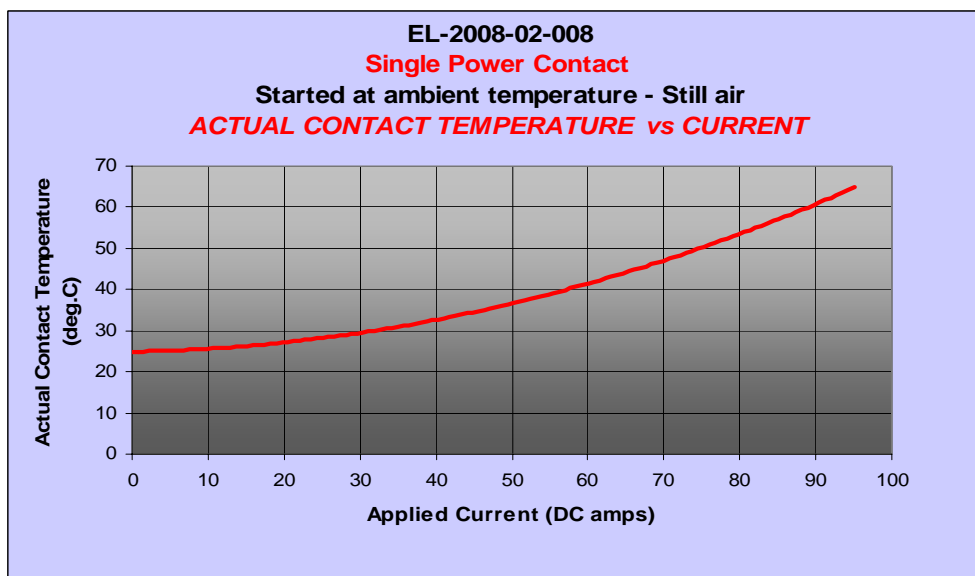
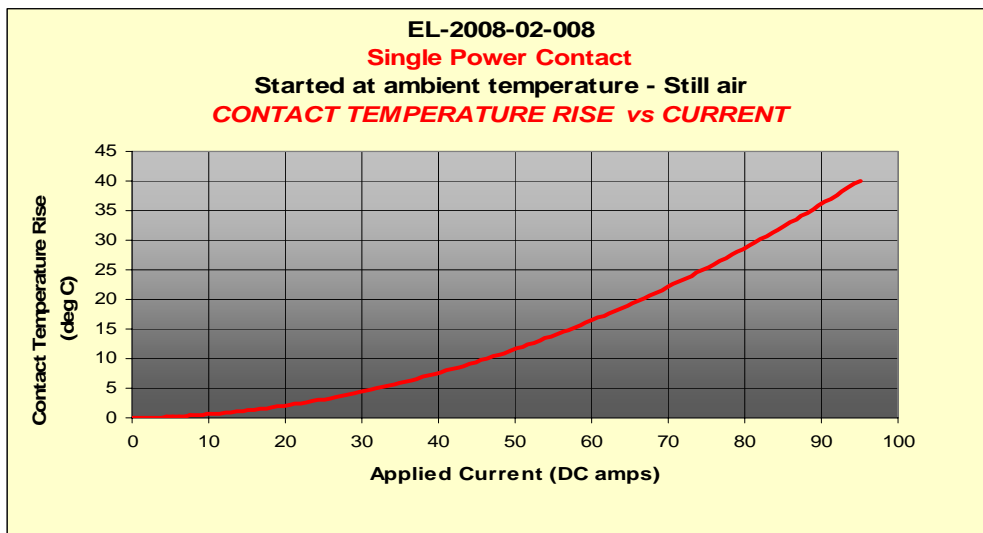
Application	Number of adjacent contacts fully powered	Test Board (Copper Pad)	Air Starting Temp.	Still Air	Forced Air (LFM)	T-Rise (°C)	Current Rating per power contact (Amp)					
HCI General product (Co Planar & Back Plane)	1	5 oz. / 2 external layers	Ambient (xx)	Yes		30	82					
	10						50					
HCI HIGH POWER MODULE (2 & 3 Position)	2						83					
	3						75					
HCI General product (Co Planar & Back Plane)	1						2 oz. / multi layers	Ambient (xx)	Yes		30	144
	2											110
	4	105										
	6	95										
	8	92										
	10	86										


TABLE 5

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 12 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

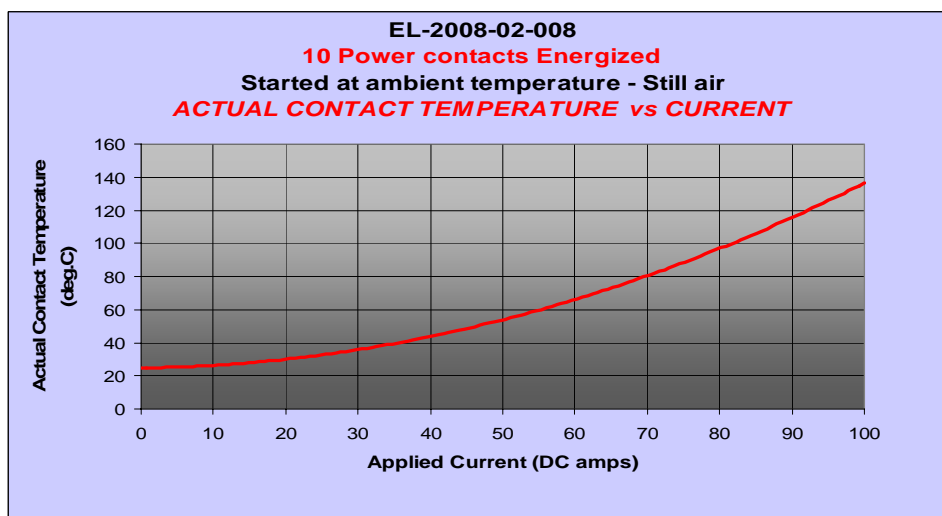
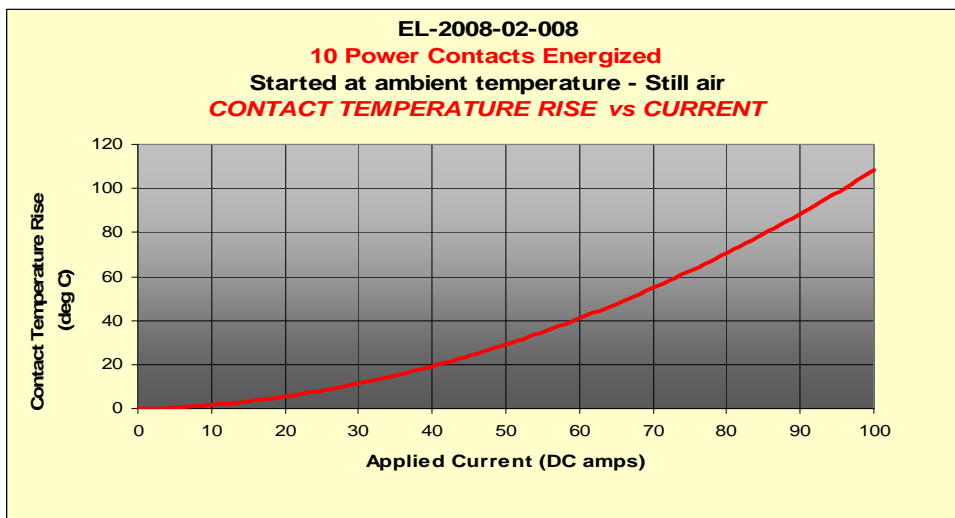
4.5.1 Current Rating (Tested with 5oz. 2 External layers test board)


SINGLE POWER CONTACT / (6.0 mm pitch product)



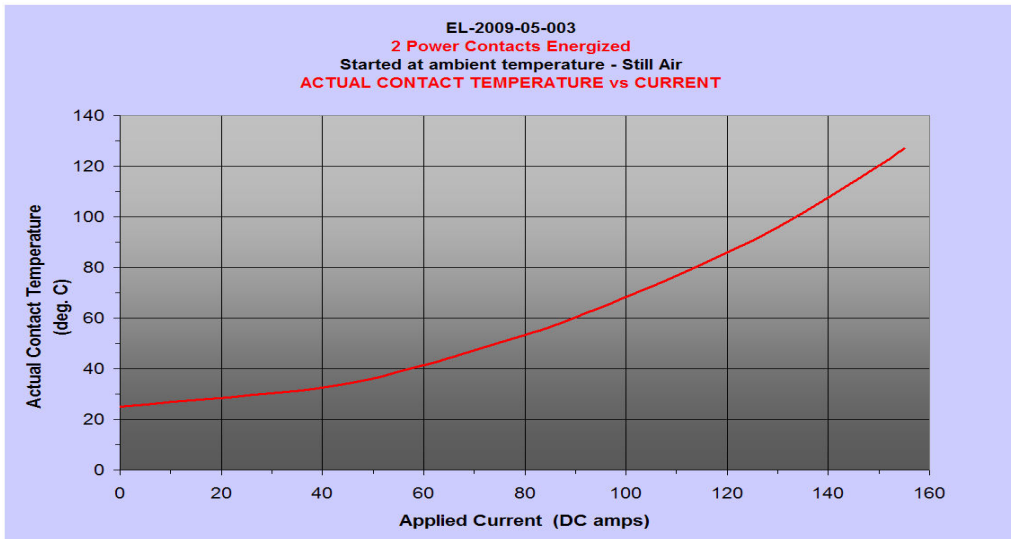
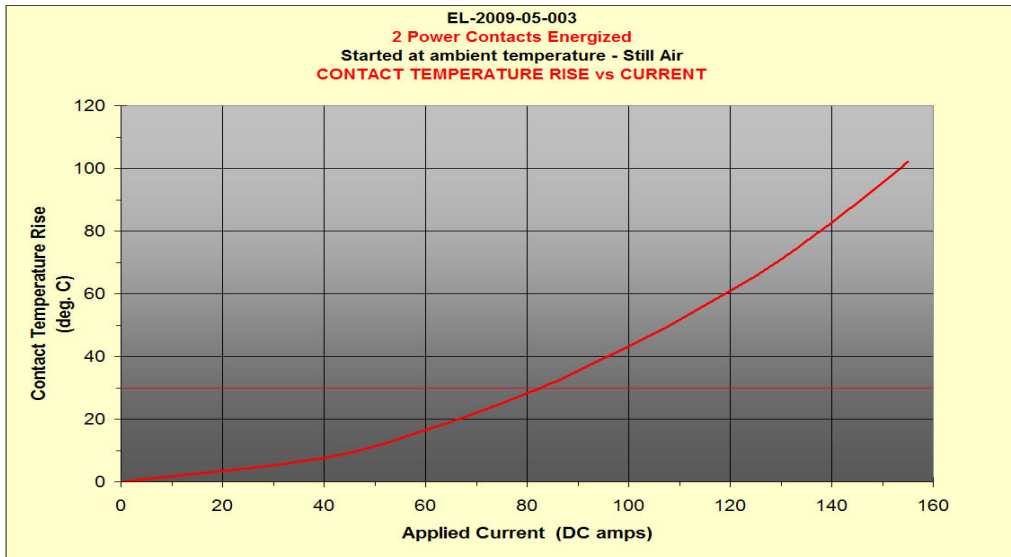
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 13 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			


10 POWER CONTACTS ENERGIZED (6.0 mm pitch product)



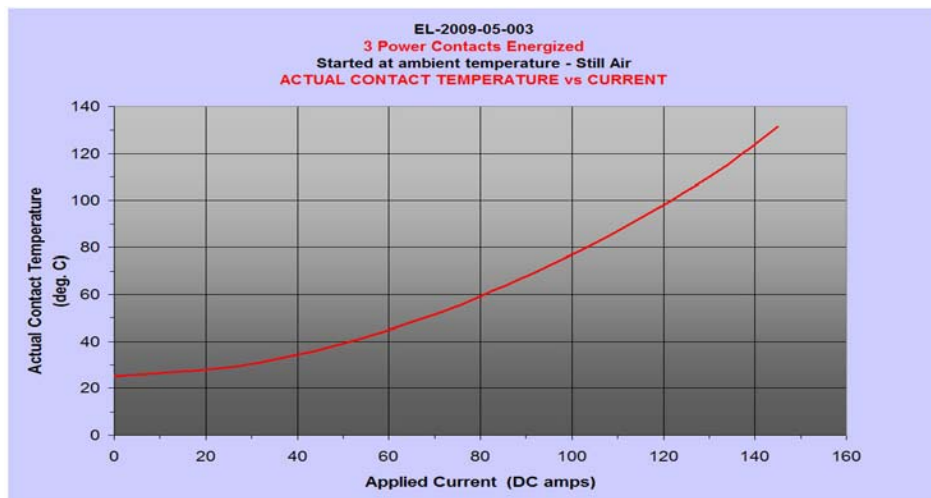
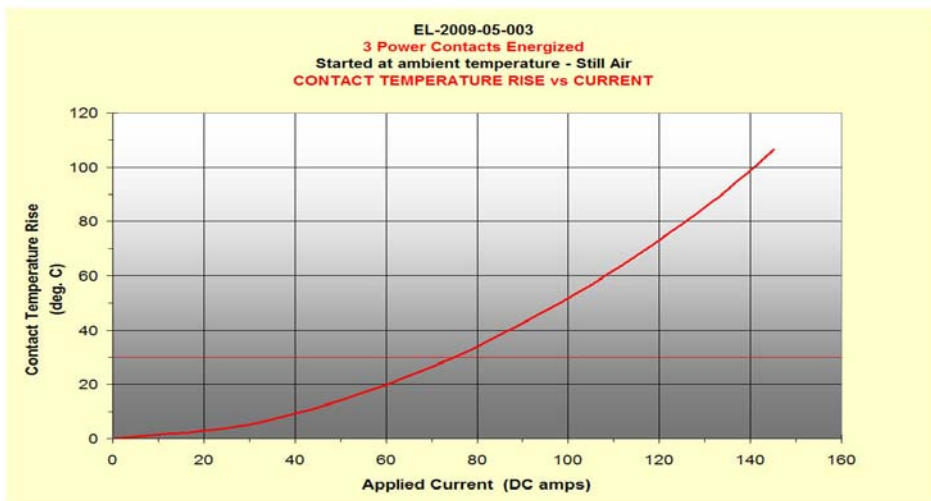
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 14 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

HCI High Power Module - 2 Power contacts Energized (7.30 mm pitch)



	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE <h1 style="text-align: center;">HCI[®]</h1> <h2 style="text-align: center;">Power Connector System</h2>		PAGE 15 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

HCI High Power Module - 3 power contacts Energized (7.30 mm Pitch)





TYPE
APPLICATION SPECIFICATION

NUMBER
GS-20-070

TITLE
**HCI[®]
Power Connector System**

PAGE
16 of 28

REVISION
C

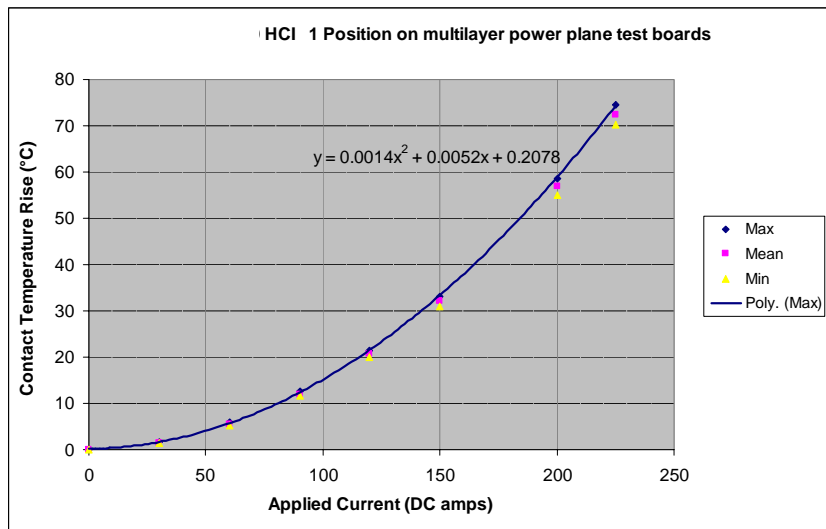
AUTHORIZED BY
H. Zhang

DATE
Nov 22 2011

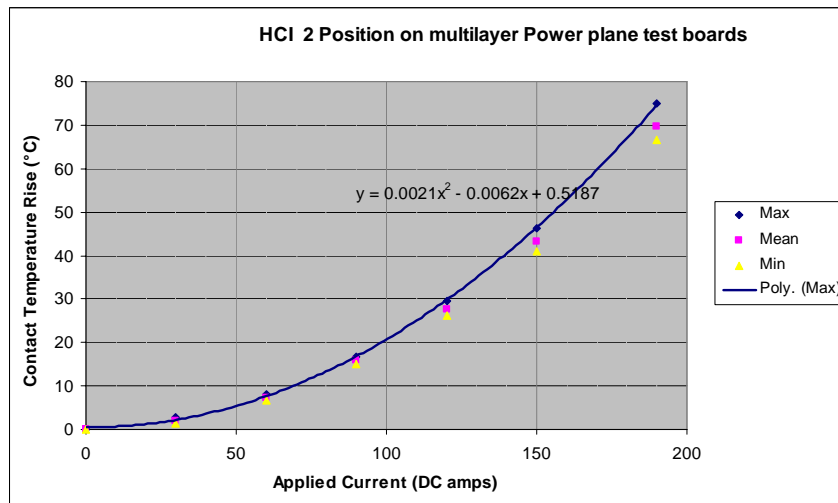
CLASSIFICATION
UNRESTRICTED

4.5.2 Current Rating (Tested with 2oz. Multi Layer test board and Still Air)

1 Position of Power



2 Position of Power





TYPE
APPLICATION SPECIFICATION

NUMBER
GS-20-070

TITLE
**HCI[®]
Power Connector System**

PAGE
17 of 28

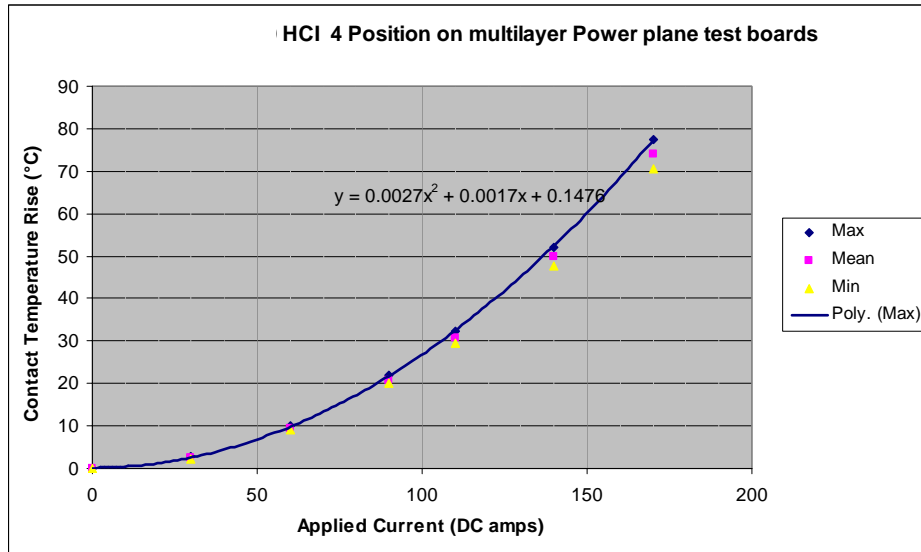
REVISION
C

AUTHORIZED BY
H. Zhang

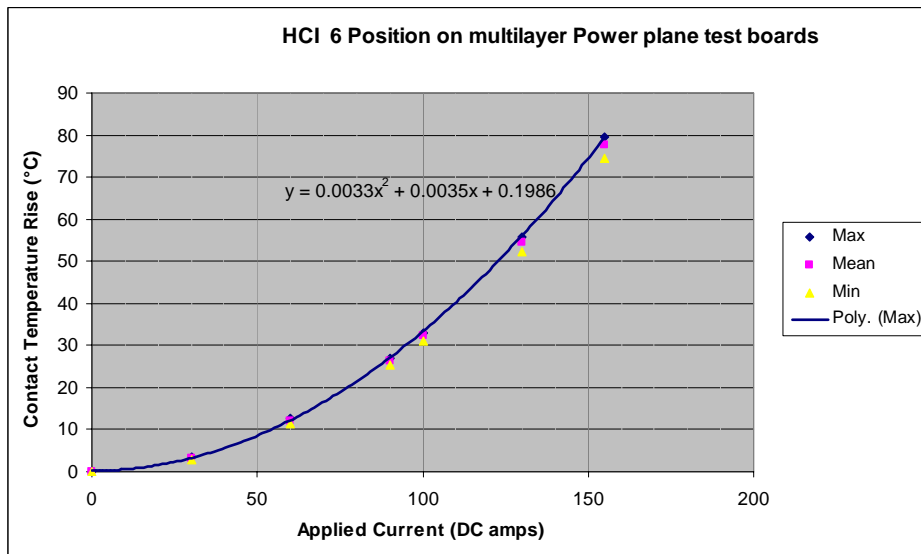
DATE
Nov 22 2011

CLASSIFICATION
UNRESTRICTED

4 Position of Power



6 Position of Power





TYPE
APPLICATION SPECIFICATION

NUMBER
GS-20-070

TITLE
**HCI[®]
Power Connector System**

PAGE
18 of 28

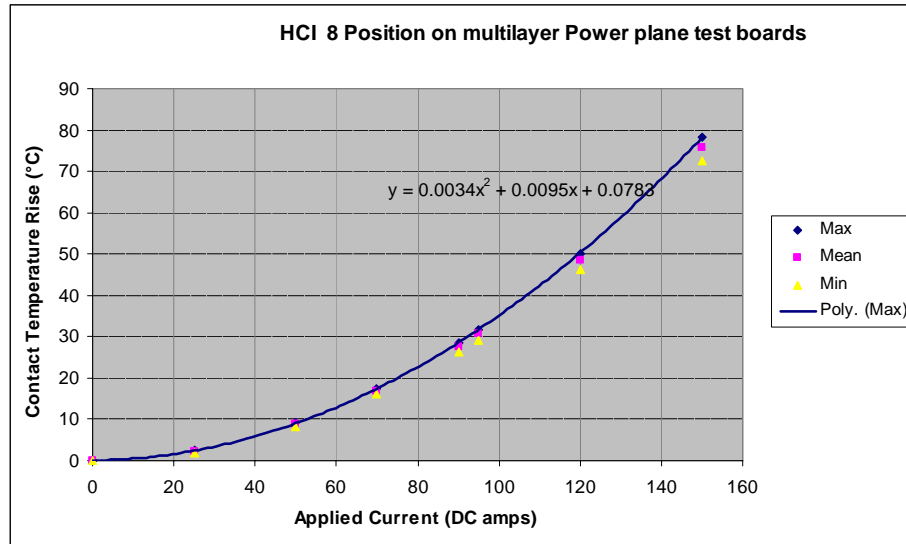
REVISION
C

AUTHORIZED BY
H. Zhang

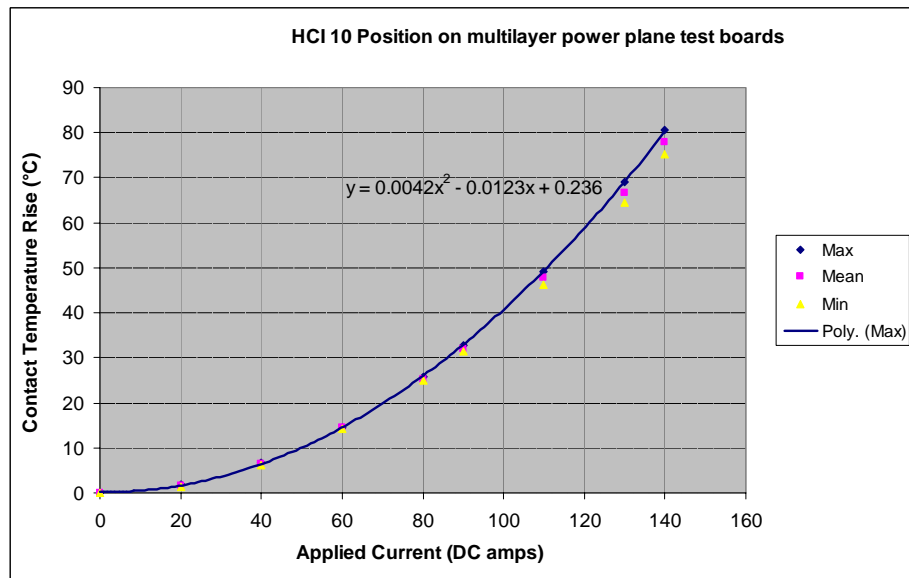
DATE
Nov 22 2011


CLASSIFICATION
UNRESTRICTED

8 Position of Power



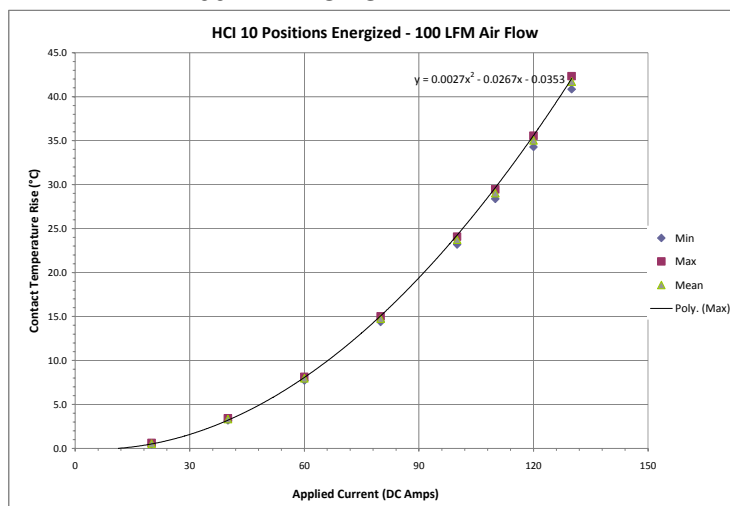
10 Position of Power



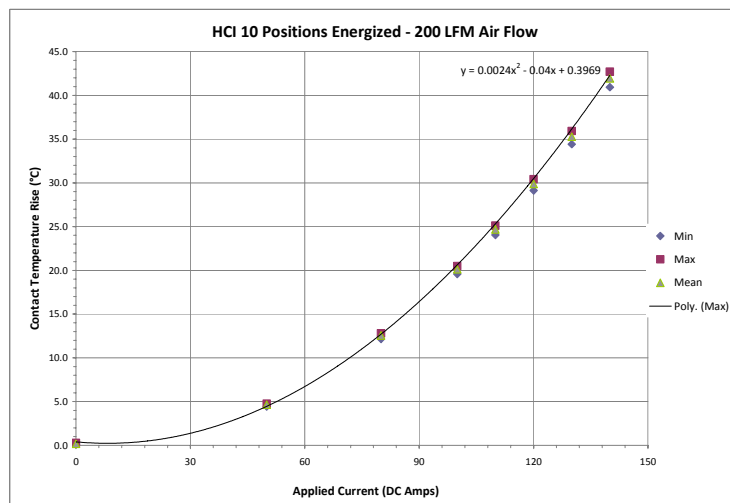
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE <h1>HCI[®]</h1> <h2>Power Connector System</h2>	PAGE 19 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

4.5.3 Additional Current Rating (Tested with 2oz. Multi Layer test board and Force Air)

100 LFM FORCED AIR



200 LFM FORCED AIR





TYPE
APPLICATION SPECIFICATION

NUMBER
GS-20-070

TITLE
**HCI[®]
Power Connector System**

PAGE
20 of 28

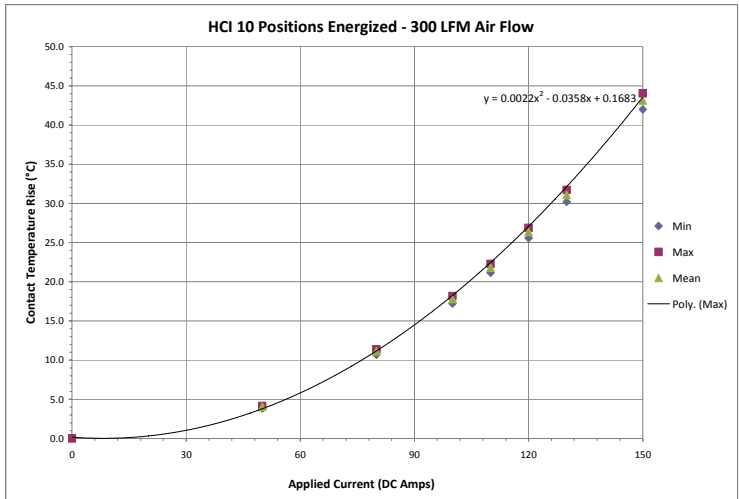
REVISION
C

AUTHORIZED BY
H. Zhang

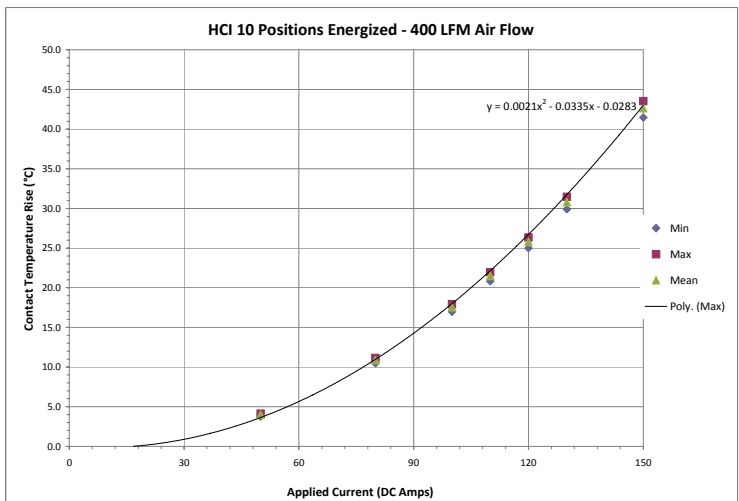
DATE
Nov 22 2011


CLASSIFICATION
UNRESTRICTED

300 LFM FORCED AIR



400 LFM FORCED AIR



	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 21 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

4.6. MECHANICAL PROPERTIES

Insertion/Retention forces per hold down clip

- The Insertion forces per hold down clip shall be less than 6 lbs.
- The retention forces per hold down clip shall be greater than 3 lbs.

Mating/Un-mating forces per power/Signal contact

Contact Type	Mating Force (N) Max. Allowance	Un-Mating Force (N) Min. Allowance
Power Contact	20	6.5
Signal Contact	0.5	0.2

TABLE 6

4.7. SAFETY


PREVENTION OF OPERATOR ACCESS TO ENERGIZED PARTS Reference UL60950 & IEC 60950-1 SECTION 2.1.1.1

UL and IEC specifications define three different probe designs to test for prevention of operator access to energized conductors (such as powered electrical contacts within an unmated backplane connector). The two probes are referred to as follows:

- **Test Finger** (Figure 8)
- **Test Probe** (Figure 8)

The following sections show each of these test probes positioned as closely as possible to the mating side contacts of the HCI R/A Receptacle, which will be located on the Daughter Card and may be powered in an unmated state.

Although the HCI Power Connector System meets these probe requirements as noted, it is not recommended that the customer "hot plug" the header to the receptacle.

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE <p style="text-align: center;">HCI[®] Power Connector System</p>		PAGE 22 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

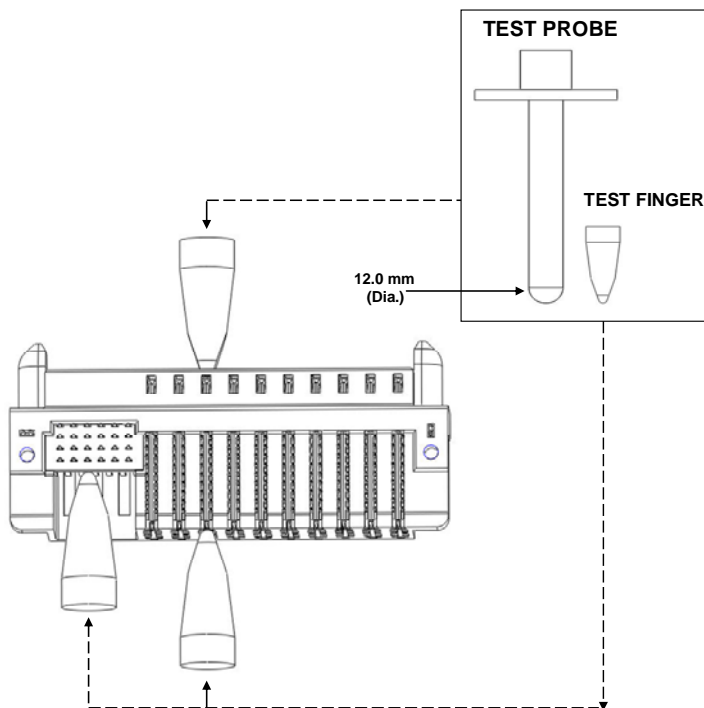
4.7.1 Test Finger


The **Test Finger** may not make contact with energized parts while the access doors and covers of the system enclosure are open. Separable connectors must be disconnected for this test. The figures show the tip of the **Test Finger** inserted into a HCI Right Angle Receptacle capture window, showing that it is impossible for the probe (shown at the smallest size per specified tolerances) to touch the receptacle contacts.

4.7.2 Test Probe

The requirements for the **Test Probe** conditions are not as clearly specified by UL and IEC. However assuming the worst-case scenario where the backplane connector is accessible, the following 3D model was created. This model shows that the Test Probe is very large compared to the Test Finger and will never come close to touching a powered contact within the representative receptacle.

FIGURE 9



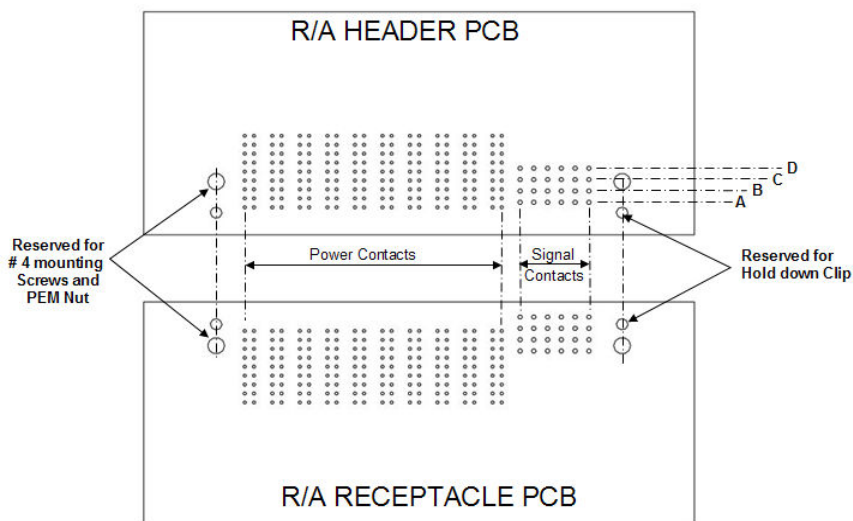
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 23 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

5. REQUIREMENT FOR CUSTOMERS PCB

Note: Generic figures are representative of all product configurations


For specifics of the PCB layout, refer to the customer drawing of the part number being applied.

FIGURE 10



Description	HCI Power Contact		HCI Signal Contact	
	(mm)	(In)	(mm)	(In)
Drilled Hole Diameter	0.810 - 0.860	0.032 - 0.034	1.125 - 1.175	0.044 - 0.046
Finished Plating Hole Diameter	0.650 - 0.800	0.026 - 0.031	0.940 - 1.100	0.037 - 0.043
Copper Plating	0.025 - 0.050	0.001 - 0.002	0.030 - 0.080	0.001 - 0.003
Tin / Lead Plating	0.005 - 0.015	0.002 - 0.006	0.008 - 0.015	0.003 - 0.006
Land / Pad Side	1.422 - 1.575	0.056 - 0.062	1.663 - 1.791	0.065 - 0.071

TABLE 7

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 24 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

For Solder and Press-Fit tail termination, the values for the PCB are as follows

TAIL TYPE	Contact Tail Length (mm/in)	PCB Maximum Thickness (mm/in)	PCB Minimum Thickness (mm/in)
SOLDER	3.43 +/- 0.254 (mm)	2.362 +/- 0.254 (mm)	
	0.135 +/- 0.010 (in)	0.093 +/- 0.010 (in)	
	4.700 +/- 0.254 (mm)	3.175 +/- 0.254 (mm)	
	0.185 +/- 0.010 (in)	0.125 +/- 0.010 (in)	
PRESS-FIT	3.43 +/- 0.254 (mm)		2.362 +/- 0.254 (mm)
	0.135 +/- 0.010 (in)		0.093 +/- 0.010 (in)
	3.80 +/- 0.254 (mm)		2.362 +/- 0.254 (mm)
	0.150 +/- 0.010 (in)		0.093 +/- 0.010 (in)

TABLE 8

5.1. PCB ALIGNMENT

FIGURE 11

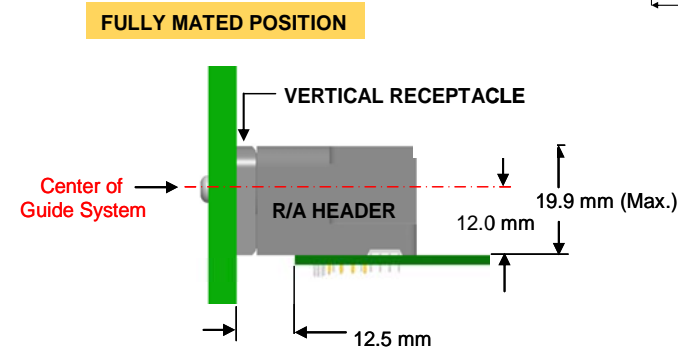
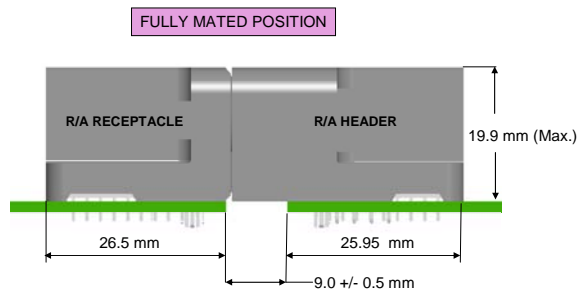



FIGURE 12

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 25 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
		CLASSIFICATION UNRESTRICTED	

APPLICATION TOOLING

No application tooling is required for the Solder Tail application

6.1. RIGHT ANGLE HEADER (STB)

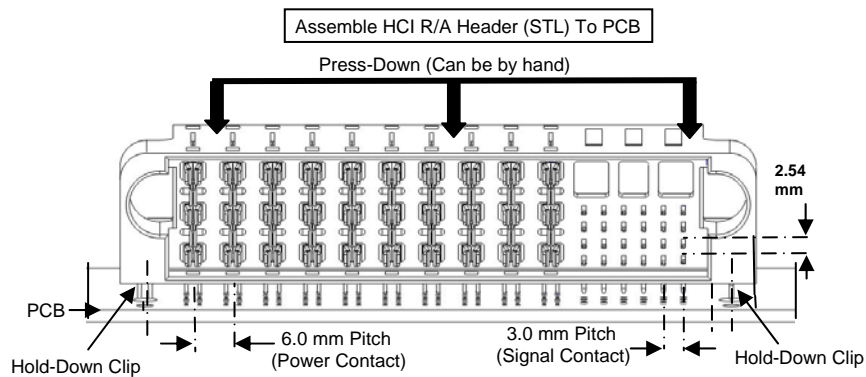


FIGURE 13

6.2. RIGHT ANGLE RECEPTACLE (STB)

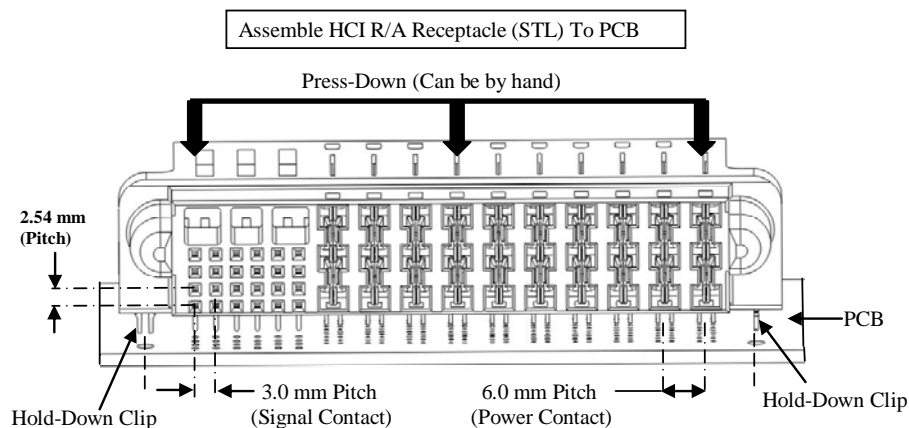



FIGURE 14

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 26 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

6.3. HOLD DOWN CLIP / APPLICATION INSPECTION REQUIREMENTS

Note: Generic figures are representative of all product configurations

Hold down Clip application inspection should consist of several simple checks to assure that the product is applied properly and is not damaged.

- Visually assure that all Solder tails are seated in the proper PCB holes and that none have been crushed during application.
- Visually assure that the plastic standoffs on the bottom of the assembly are seated within 0.10 mm of flush to the PCB but not crushed (see Figure 15). A larger gap beneath the standoffs may indicate that the product is not seated parallel or perpendicular to the board. In the case of the header, this can cause misalignment with adjacent components.

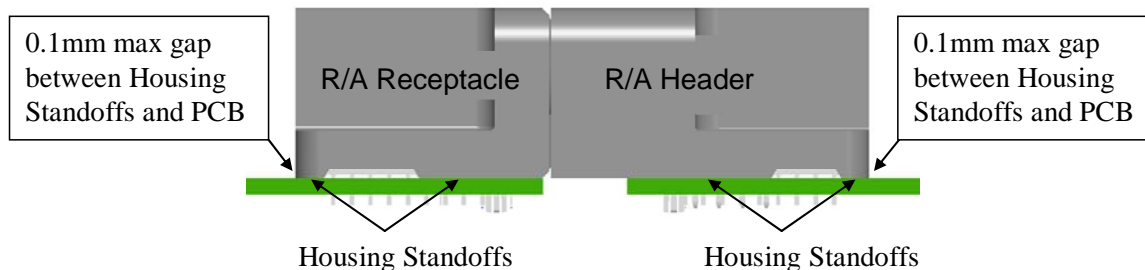


FIGURE 15
Proper Seating Depth

6.4. VERTICAL RECEPTACLE (6.0 mm Pitch- Press-Fit)

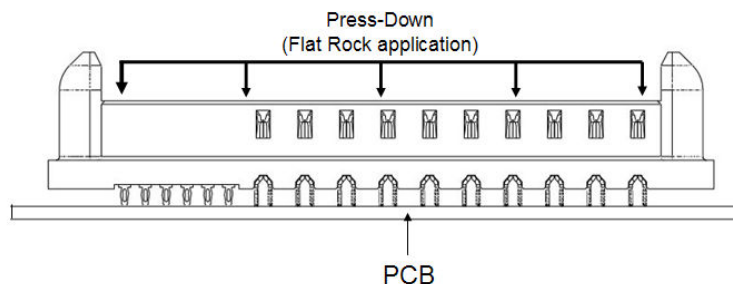



FIGURE 16

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
	TITLE HCI[®] Power Connector System	PAGE 27 of 28	REVISION C
AUTHORIZED BY H. Zhang		DATE Nov 22 2011	
CLASSIFICATION UNRESTRICTED			

6.5. HCI HIGH POWER MODULE (7.30 mm Pitch- Press-Fit)

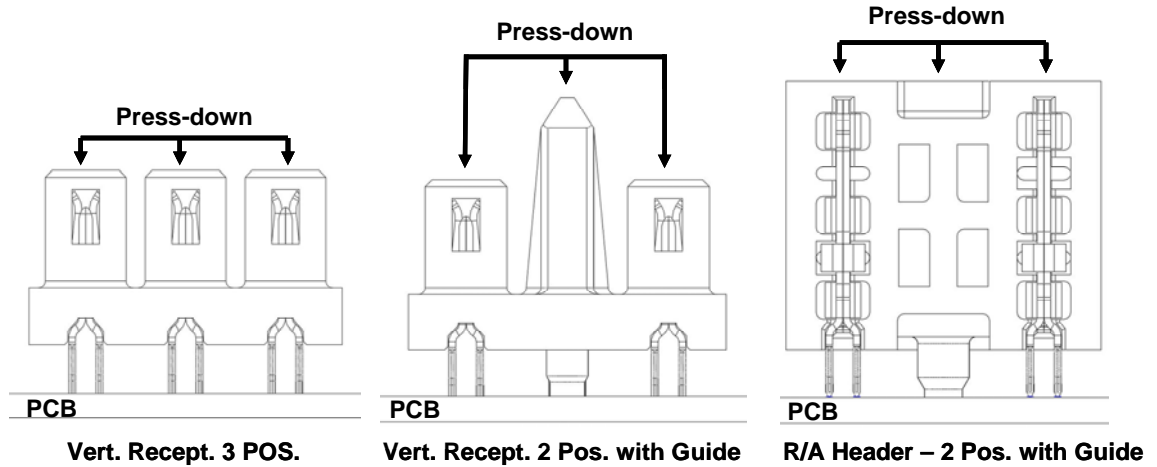


FIGURE 17

- Visually assure that the plastic standoffs on the bottom of the assembly are seated within 0.10 mm of flush to the PCB but not crushed (see Figure 19). A larger gap beneath the standoffs may indicate that the product is not seated parallel or perpendicular to the board. In the case of the header, this can cause misalignment with adjacent components.

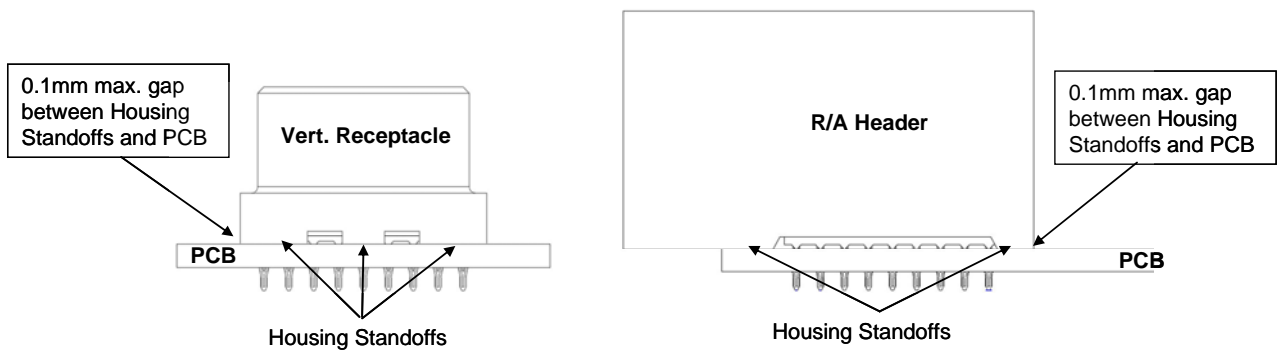



FIGURE 18

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-070	
TITLE HCI[®] Power Connector System		PAGE 28 of 28	REVISION C
		AUTHORIZED BY H. Zhang	DATE Nov 22 2011
CLASSIFICATION UNRESTRICTED			

7. REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
A	ALL	NEW RELEASED	V08-0269	06/18/2008
B	ALL	ADDED HCI HIGH POWER MODULE TEST DATA and SPECIFICATION.	DG10-0108	03/19/2010
C	9-21	Updated Max. Working Voltage and added T-rise test data with multi test board – with still and forced air	ELX-DG-008100-1	11/22/2011