
	TYPE	APPLICATION SPECIFICATION		NUMBER	GS-20-128
	TITLE	HIGH POWER CARD EDGE (HPCE®) CONNECTOR		PAGE	1 of 17
				REVISION	C
				AUTHORIZED BY	Wei-Long Zhang
				DATE	July, 16, 2012
				CLASSIFICATION	UNRESTRICTED

TABLE OF CONTENTS

<u>Section</u>	<u>page no.</u>
1. OBJECTIVE.....	1
2. SCOPE	2
3. DRAWINGS AND APPLICABLE DOCUMENTS	3
4. GENERAL CUSTOMER INFORMATION	3
4.1 PRODUCT APPLICATION.....	3
4.2 WIPE DISTANCE AND CONTACT SEQUENCING.....	5
4.3 MATING ALIGNMENT.....	6
4.4 VOLTAGE RATING	7
4.5 CURRENT RATING	9
4.6 MECHANICAL PROPERTIES.....	10
4.7 SAFETY.....	10
5. REQUIREMENT FOR CUSTOMERS PCB	12
5.1 PCB LAYOUT.....	12
5.2 EDGE CARD LAYOUT.....	13
6. APPLICATION TOOLING (UPDATE)	14
6.1. VERTICAL RECEPTACLE STB.....	15
6.2. VERTICAL RECEPTACLE PRESS-FIT.....	15
6.3. RIGHT ANGLE RECEPTACLE (STB).....	16
6.4. STRADDLE MOUNT (REFLOW SOLDER).....	16
7. REVISION RECORD	17

1. OBJECTIVE

This specification provides information and requirements for customer application of the HPCE Connector 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-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 2 of 17	REVISION C
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012
		CLASSIFICATION UNRESTRICTED	

2. SCOPE

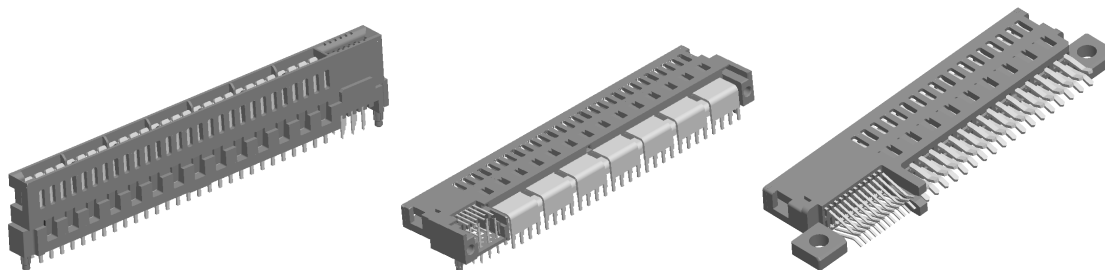
This specification provides information and requirements regarding application of the HPCE Connector System to printed circuit boards (PCB).


Table 1

High Power Card Edge	Vertical Receptacle, Solder & Press-fit Tail
	Right Angle Receptacle, Solder Tail
	Straddle Mount, Solder Tail

Figure 1

HPCE Connector System



	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 3 of 17	REVISION C
AUTHORIZED BY Wei-Long Zhang		DATE July, 16, 2012	
CLASSIFICATION UNRESTRICTED			

3. DRAWINGS AND APPLICABLE DOCUMENTS

- FCI Product Specification GS-12-604 (HPCE Connector system).
- UL/CSA File # E66906 -Volume 1 - Section 124
- TUV certification # B 11 05 34414 012
- Applicable FCI Product Drawings

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*

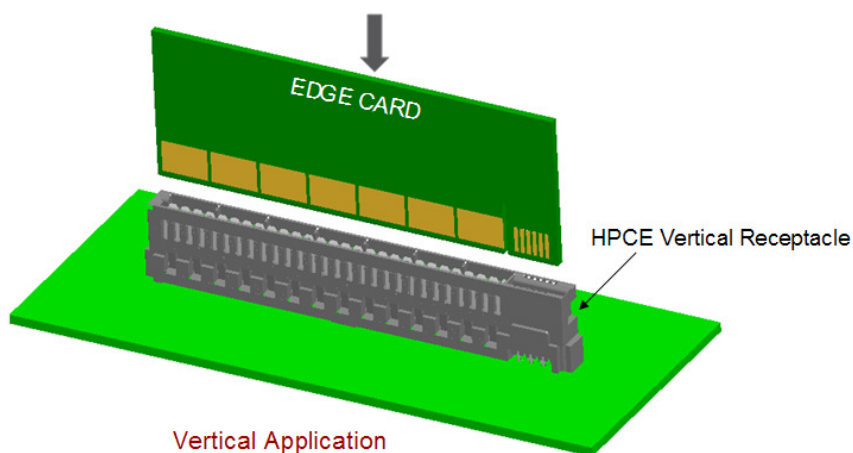

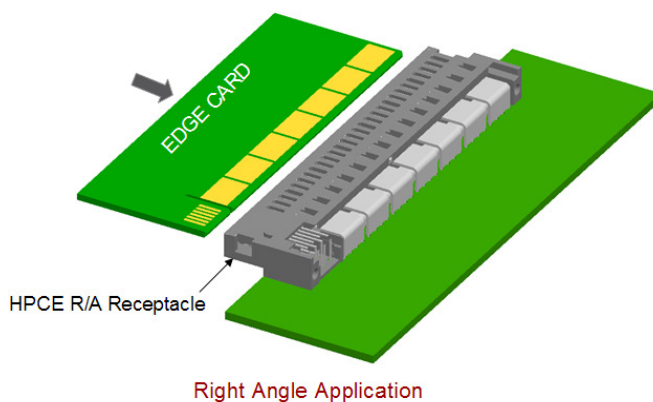


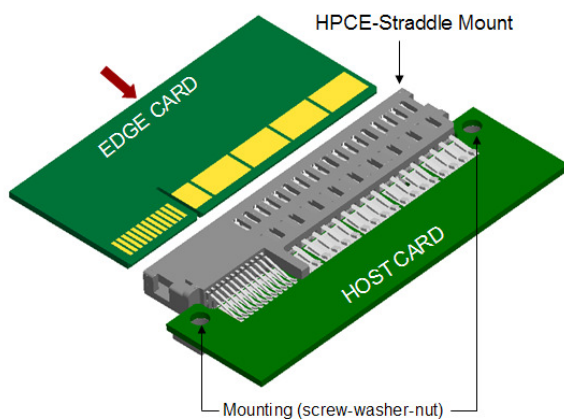
Figure 2

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR		PAGE 4 of 17	REVISION C
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012
CLASSIFICATION UNRESTRICTED			




Right Angle Application

Figure 3



Straddle Mount Application

Figure 4

	TYPE	APPLICATION SPECIFICATION		NUMBER	GS-20-128			
	TITLE	HIGH POWER CARD EDGE (HPCE®) CONNECTOR			PAGE	5 of 17	REVISION	C
				AUTHORIZED BY	Wei-Long Zhang		DATE	July, 16, 2012
				CLASSIFICATION	UNRESTRICTED			

HPCE has two options for connection to Printed Circuit Boards -- Press Fit and Solder to Board, available as follows:

Table 2

Product Configuration	Solder Tail	Press-Fit Tail
HPCE - Vertical Receptacle	x	x
HPCE - R/A Receptacle	x	
HPCE - Straddle Mount	x	

The HPCE Solder to Board Power and Signal contacts are compatible with several soldering processes, including wave soldering. They are versatile with many configurations to fit the individual needs of the client.

HPCE products are 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.

4.2 WIPE DISTANCE AND CONTACT SEQUENCING

The nominal wipe distance of the Signal contact is shorter than the Power contact by 1.27mm (0.050 inch).

Recommended minimum wipe is 1.5mm. 1.0mm minimum wipe can be used in low shock/vibration situations where system boards and components are locked in place to eliminate relative motion.

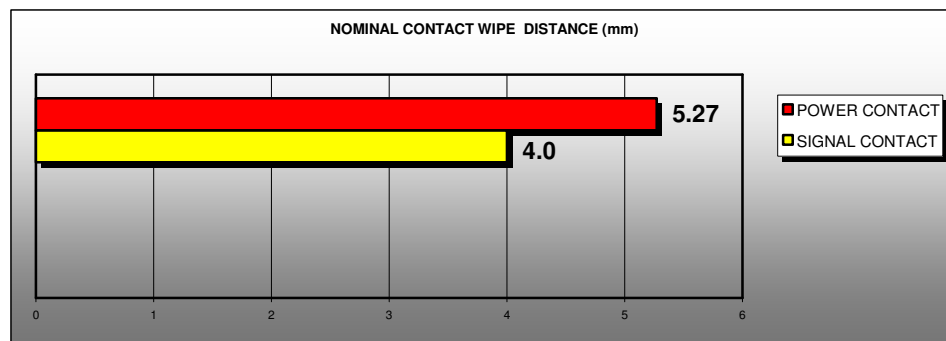



Table 3

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 6 of 17	REVISION C
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012
		CLASSIFICATION UNRESTRICTED	

4.3. MATING ALIGNMENT

4.3.1 Under 100 mm connector length.

The HPCE connector design has not included a guide system therefore the design is not for a blind mate application. The mis-alignment allowance of the HPCE product is depended on the condition of the connector system and the chamfer of the edge card. Please see figure 5 and table 4 for explanation.

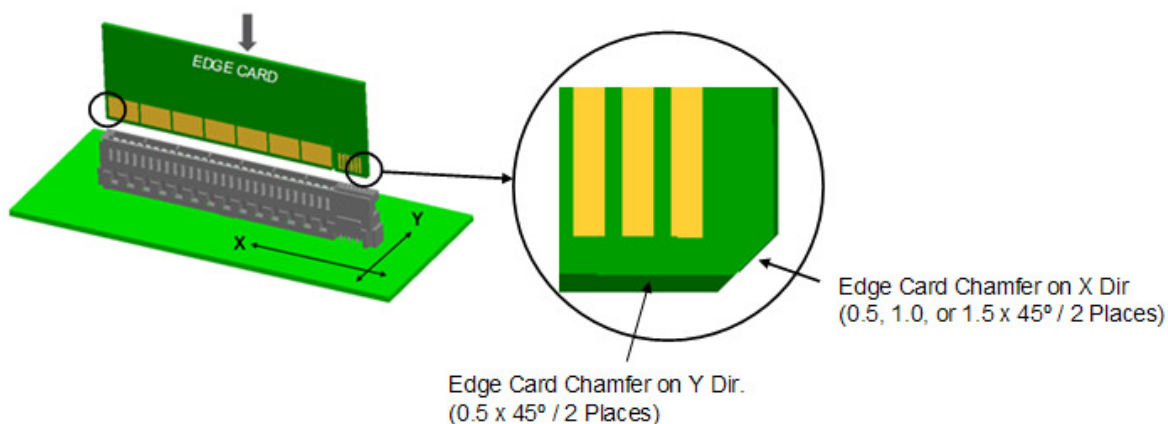



Figure 5

Connector Mating Condition	Edge Card Chamfer (mm)		Mis-Alignment Allowance (mm)	
	X	Y	X	Y
One Side is in Stationary condition, other side is in floating condition.	0.50	0.50	1.85 ± 0.125	1.46 ± 0.13
	1.00		2.35 ± 0.125	
	1.50		2.85 ± 0.125	
Both Side are in Stationary Condition			0.15 ± 0.056	0.115 ± 0.07

Table 4

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 7 of 17	REVISION C
AUTHORIZED BY Wei-Long Zhang		DATE July, 16, 2012	
CLASSIFICATION UNRESTRICTED			

4.4 VOLTAGE RATING

The Maximum Working Voltage of the HPCE connector system is rated base on UL 60950-1 Second Edition Table 2N.

- Pollution Degree : 2 (Office Environmental)
- Material Group : 1 (Based on UL rating)

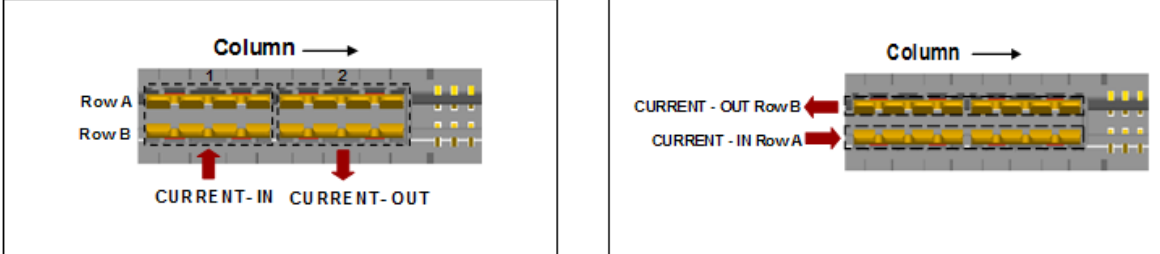

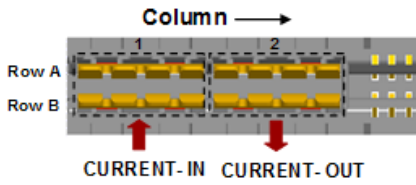
HPCE - VERTICAL					HPCE - VERTICAL				
"DIFFERENT" CURRENT PATH IN THE ROW OF POWER CONTACTS					"SAME" CURRENT PATH IN THE ROW OF POWER CONTACTS				
POSITION	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)	POSITION	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)
Power to Power	2.54	0.7	100	140	Power to Power	2.7	2.1	420	594
	5.08	3.24	639	903	Power to Signal	3.5	2.4	480	679
Power to Signal	3.5	2.4	480	679	Signal to Signal	1.27	0.41	12	17
Signal to Signal	1.27	0.41	12	17		2.54	1.68	336	475
	2.54	1.68	336	475					

Table 5

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 8 of 17	REVISION C
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012
CLASSIFICATION UNRESTRICTED			

HPCE - RIGHT ANGLE				
"DIFFERENT" CURRENT PATH IN THE ROW OF POWER CONTACTS				
POSITION	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)
Power to Power	2.54	0.7	100	140
	5.08	3.24	639	903
Power to Signal	3.5	2.4	480	679
Signal to Signal	1.27	0.41	12	17
	2.54	1.68	336	475



HPCE - RIGHT ANGLE				
"SAME" CURRENT PATH IN THE ROW OF POWER CONTACTS				
DISTANCE	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)
Power to Power	2.54	1.94	388	548
Power to Signal	3.5	2.4	480	679
Signal to Signal	1.27	0.41	12	17
	2.54	1.68	336	475

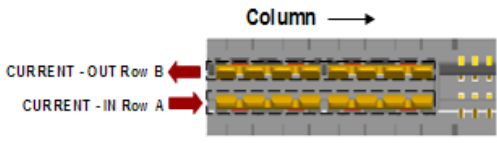

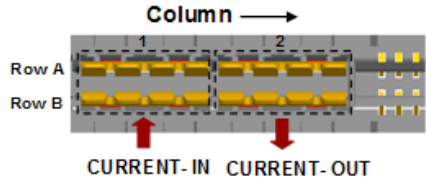


Table 6

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 9 of 17	REVISION C
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012
CLASSIFICATION UNRESTRICTED			

HPCE - STRADDLE MOUNT				
"DIFFERENT" CURRENT PATH IN THE ROW OF POWER CONTACTS				
POSITION	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)
Power to Power	2.54	0.7	100	140
	5.08	3.24	639	903
Power to Signal	3.5	2.4	480	679
Signal to Signal	1.27	0.41	12	17
	2.54	1.88	336	475



HPCE - STRADDLE MOUNT				
"SAME" CURRENT PATH IN THE ROW OF POWER CONTACTS				
POSITION	Tail Pitch (mm) between two contacts	MCD (mm)	AC RMS Working Voltage (Volt)	DC / AC peak Working Voltage (Volt)
Power to Power	2.54	2.1	420	594
Power to Signal	3.5	2.4	480	679
Signal to Signal	1.27	0.41	12	17
	2.54	1.88	336	475

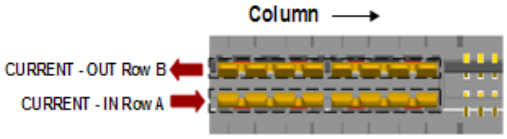


Table 7


4.5 CURRENT RATING

(Refer to FCI Product Specification GS-12-604 (for additional information))

Following are the current rating values of the HPCE connector system

Configuration	Number Power Pins (Fully Energized)	Edge Card	Air Temp. (Starting / C°)	Still Air (No Forced Air)	T-Rise (max. / C°)	Typical Current Rating (Single Power Pin/ Amps)	Signal Contact	Remark
24P	24	1.6 mm thick	Ambient	Yes	30	11.0	N/A	5 Oz. - 2 External Layers test board
40P	40					10.0		
56P-12S	56					9.0		
56P-12S	0					N/A	7.0	

Table 8

	TYPE	APPLICATION SPECIFICATION		NUMBER	GS-20-128		
	TITLE	HIGH POWER CARD EDGE (HPCE®) CONNECTOR		PAGE	10 of 17	REVISION	C
				AUTHORIZED BY	Wei-Long Zhang	DATE	July, 16, 2012
				CLASSIFICATION	UNRESTRICTED		

4.6. MECHANICAL PROPERTIES

Mating/Un-mating forces

Configuration	Mating Force (N) (Max. Allowance)	Un-Mating Force (N) (Min. Allowance)
56P+12S	53.9	15.9
Single POWER Contact Beam	0.98	0.36
Single SIGNAL Contact Beam	0.22	0.06

Table 9

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 connector). The two probes are referred to as follows:

- **Test Finger** (Figure 6)
- **Test Probe** (Figure 6)

The following sections show each of these test probes positioned as closely as possible to the mating side contacts of the Vertical HPCE, which will be located on the PCB and may be powered in an unmated state.

Although the Vertical HPCE connector system meets these probe requirements as noted, it is not recommended that the customer “hot plug” the edge card to the vertical receptacle.

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128	
TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR		PAGE 11 of 17	REVISION C
CLASSIFICATION UNRESTRICTED		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012

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 Vertical HPCE 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 HPCE 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.

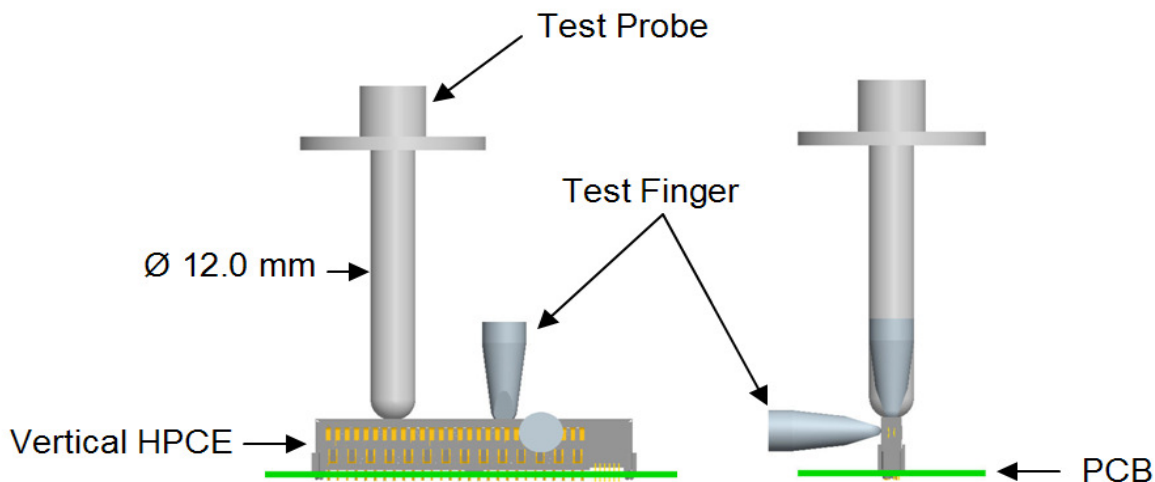



Figure 6

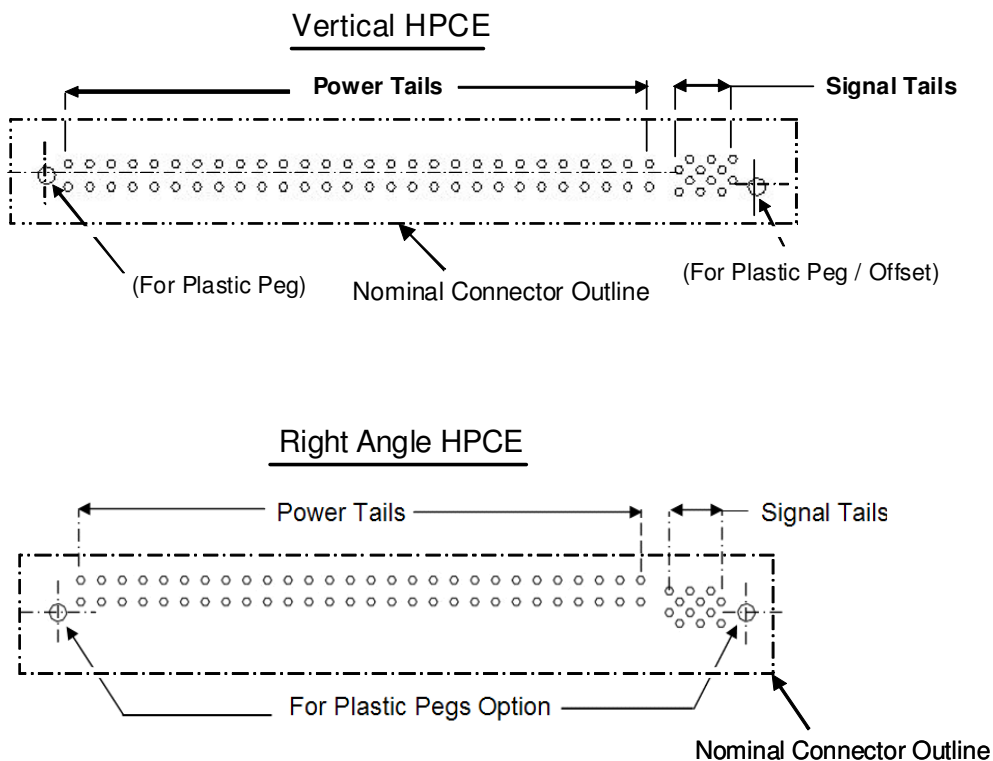
	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128		
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 12 of 17	REVISION C	
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012	
		CLASSIFICATION UNRESTRICTED		

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.

5.1 **PCB LAYOUT** (See customer drawing for more details)



"Power and signal traces inside the connector zone need to be coated or under solder mask to protect against oxidation and minimize wear or damage during assembly and handling."



TYPE
APPLICATION SPECIFICATION

NUMBER
GS-20-128

TITLE
HIGH POWER CARD EDGE (HPCE®) CONNECTOR

PAGE
13 of 17

REVISION
C

AUTHORIZED BY
Wei-Long Zhang

DATE
July, 16, 2012

CLASSIFICATION
UNRESTRICTED

RECOMMENDED HOST BOARD FOR STRADDLE MOUNT

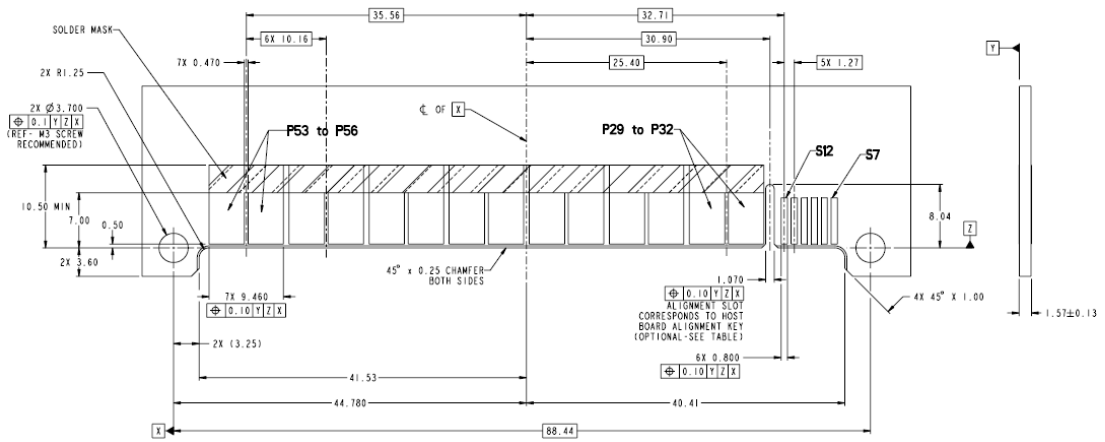



Figure 9

PLATED THROUGH HOLE REQUIREMENTS

CONTACT TYPE	TOP LAYER DESCRIPTION	TABLE 1 (HPCE / SOLDER TAILS) PLATED THROUGH-HOLE REQUIREMENTS				
		DRILLED HOLE DIAMETER	COPPER THICKNESS	TIN-LEAD THICKNESS	TIN THICKNESS	FINISHED HOLE DIAMETER
POWER & SIGNAL	TIN-LEAD	1.10-1.16 (1.15 DRILL)	0.025 - 0.050	0.005 - 0.015	--	0.94 - 1.10
	IMMERSION TIN	1.10-1.16 (1.15 DRILL)	0.025 - 0.050	--	0.9 - 1.5µm	0.94 - 1.10
	COPPER (SEE NOTE 8)	1.10-1.16 (1.15 DRILL)	0.025 - 0.050	--	--	0.94 - 1.10

CONTACT TYPE	TOP LAYER DESCRIPTION	TABLE 2 (HPCE / PRESS-FIT TAILS) PLATED THROUGH-HOLE REQUIREMENTS				
		DRILLED HOLE DIAMETER	COPPER THICKNESS	TIN-LEAD THICKNESS	TIN THICKNESS	FINISHED HOLE DIAMETER
POWER & SIGNAL	TIN-LEAD	0.81-0.86 (0.85 DRILL)	0.025 - 0.050	0.005 - 0.015	--	0.65 - 0.80
	IMMERSION TIN	0.81-0.86 (0.85 DRILL)	0.025 - 0.050	--	0.9 - 1.5µm	0.70 - 0.80
	COPPER (SEE NOTE 8)	0.81-0.86 (0.85 DRILL)	0.025 - 0.050	--	--	0.70 - 0.80

Table 10

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128		
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 14 of 17	REVISION C	
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012	
		CLASSIFICATION UNRESTRICTED		

For R/A solder tail termination, The values for the PCB are as follows

Tail lengths(mm)	Recommended PCB Thickness(mm)
2.60+/-0.35	1.57+/-0.25
3.25+/-0.40	1.57+/-0.25~2.25+/-0.25
4.05+/-0.40	3.05+/-0.25

Table 11

5.2 EDGE CARD LAYOUT(Ref. 56P-12S)

RECOMMENDED EDGE CARD FOOT PRINT

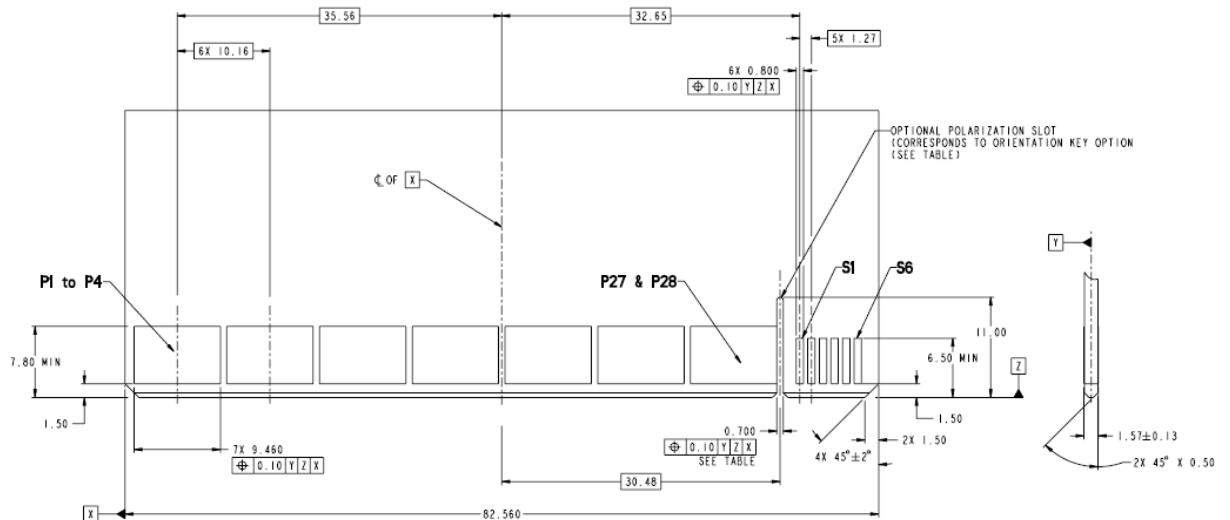



Figure 10

6 APPLICATION TOOLING

No application tooling is required for the Solder Tail
 Application tooling is required for the vertical Press fit. Tooling drawing number is 10119453.

For Solder Tail configuration, the total insertion force of two plastic pegs should not exceed 340 N (76 lbs)

	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128		
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 15 of 17	REVISION C	
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012	
		CLASSIFICATION UNRESTRICTED		

6.1. VERTICAL RECEPTACLE (SOLDER)

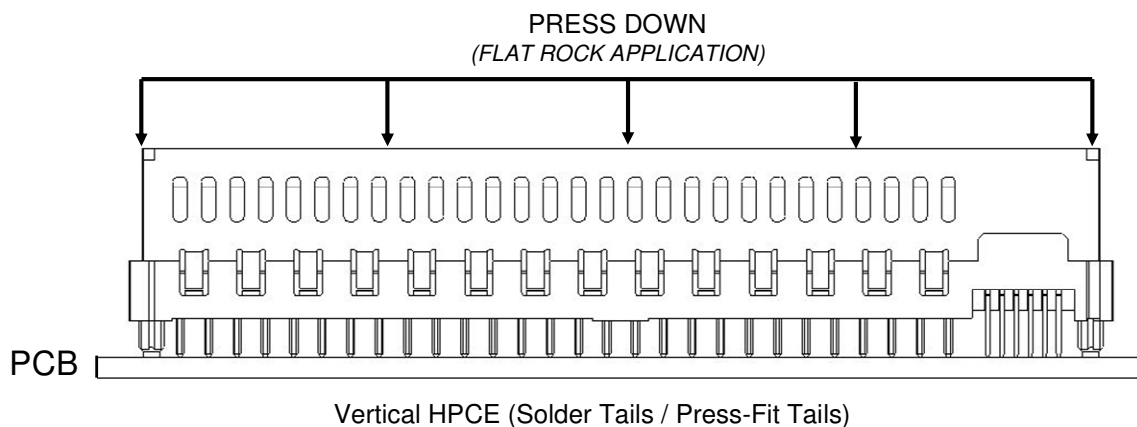
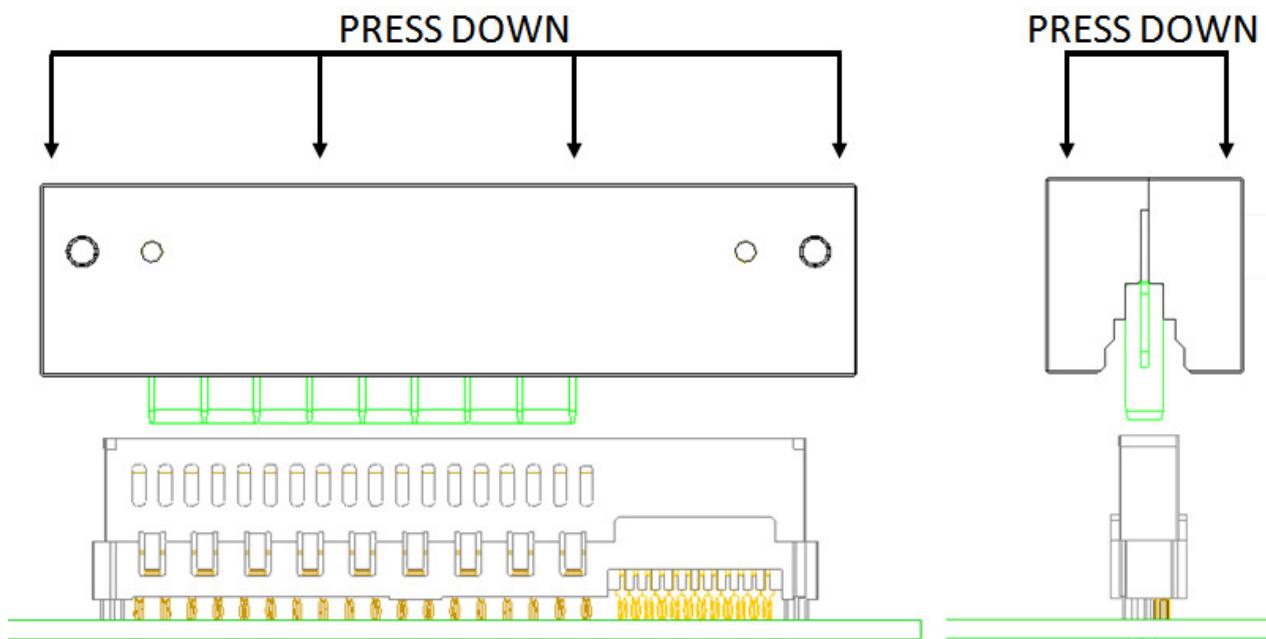



Figure 11

6.2. VERTICAL RECEPTACLE (PRESS-FIT) APPLICATION TOOLING



	TYPE APPLICATION SPECIFICATION	NUMBER GS-20-128		
	TITLE HIGH POWER CARD EDGE (HPCE®) CONNECTOR	PAGE 16 of 17	REVISION C	
		AUTHORIZED BY Wei-Long Zhang	DATE July, 16, 2012	
		CLASSIFICATION UNRESTRICTED		

6.3 RIGHT ANGLE RECEPTACLE (STB)

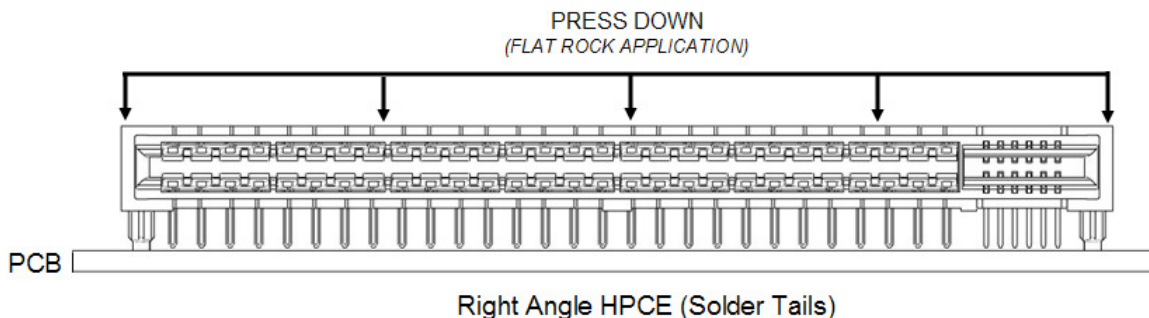


Figure 12

6.4 STRADDLE MOUNT (STB)

For Straddle Mount 56P-12S configuration, the insertion force on the host board side should not exceed 150 N.

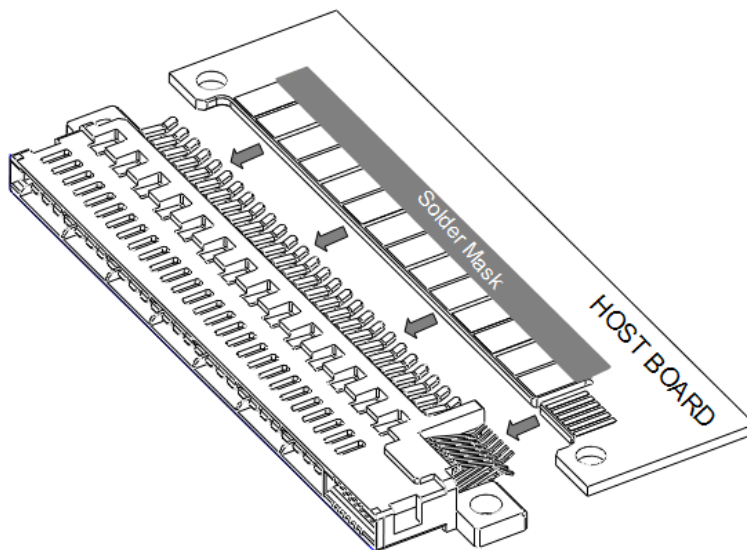



Figure 13

	TYPE	APPLICATION SPECIFICATION		NUMBER	GS-20-128			
	TITLE	HIGH POWER CARD EDGE (HPCE®) CONNECTOR			PAGE	17 of 17	REVISION	C
				AUTHORIZED BY	Wei-Long Zhang		DATE	July, 16, 2012
				CLASSIFICATION	UNRESTRICTED			

7. REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
A	ALL	RELEASE APPLICATION SPECIFICATION	N/A	02/17/2011
B	3,6,12	ADDED UL/CSA/TUV CERTIFICATION (Page 3) AND MORE DETAILS TO MIS-ALIGNMENT ALLOWANCE (Table 4 / Page 6)- Added Note to PCB layout (page 12).		08/22/2011
C	9,14,15	ADDED R/A SOLDER TAIL TAIL LENGTH OPTION, ADD APPLICATION TOOLING FOR VERTICAL PF.	ELX-DG-012170	07/16/2012