


NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 1 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## TABLE OF CONTENTS

<u>Section</u>	<u>page no.</u>
<b>1. OBJECTIVE.....</b>	<b>2</b>
<b>2. SCOPE .....</b>	<b>2</b>
<b>3. DRAWINGS AND APPLICABLE DOCUMENTS .....</b>	<b>2</b>
<b>4. GENERAL CUSTOMER INFORMATION.....</b>	<b>3</b>
4.1. CONNECTOR CONFIGURATIONS.....	3
4.2. COMPATIBILITY.....	6
4.3. MATING ALIGNMENT.....	7
4.4. CONTACT WIPE DISTANCES.....	7
4.5. VOLTAGE RATING: .....	9
4.6. CURRENT RATING and DE-RATING:.....	9
4.7. SAFETY .....	34
<b>5. REQUIREMENTS FOR CUSTOMER PCB LAYOUT.....</b>	<b>37</b>
<b>6. APPLICATION TOOLING.....</b>	<b>39</b>
6.1. Metral™ High Power HEADERS .....	39
6.2. Metral™ High Power RECEPTACLES .....	40
6.3. AirMax™ Power HEADERS.....	41
6.4. AirMax™ Power RECEPTACLES.....	42
6.5. CUSTOM TOOLING .....	44
6.6. INSERTION PRESSES .....	44
<b>7. APPLICATION PROCEDURE .....</b>	<b>46</b>
7.1. HEADERS.....	46
7.2. RECEPTACLES.....	47
7.3. RECOMMENDED INSERTION FORCES .....	48
<b>8. POST-APPLICATION INSPECTION REQUIREMENTS .....</b>	<b>49</b>
<b>9. REMOVAL TOOLING .....</b>	<b>50</b>
9.1. 1x2 HEADER, Metral™ High Power .....	50
9.2. 2x2 HEADER, Metral™ High Power .....	50
9.3. RECEPTACLE, Metral™ High Power.....	50
9.4. 1x2 HEADER, AirMax™ Power .....	51
9.5. 2x2 HEADER, AirMax™ Power .....	51
9.6. VERTICAL RECEPTACLE, AirMax™ Power .....	51
9.7. R/A RECEPTACLE, AirMax™ Power.....	52
<b>10. REVISION RECORD .....</b>	<b>52</b>

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 2 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 1. OBJECTIVE

This specification provides information and requirements for customer application of the 2mm High Power press-fit headers and receptacles. 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.

## 2. SCOPE

This specification provides information and requirements regarding application of 2mm High Power press-fit headers and receptacles to printed circuit boards (PCB). It includes both Metral™ High Power and AirMax™ Power products.

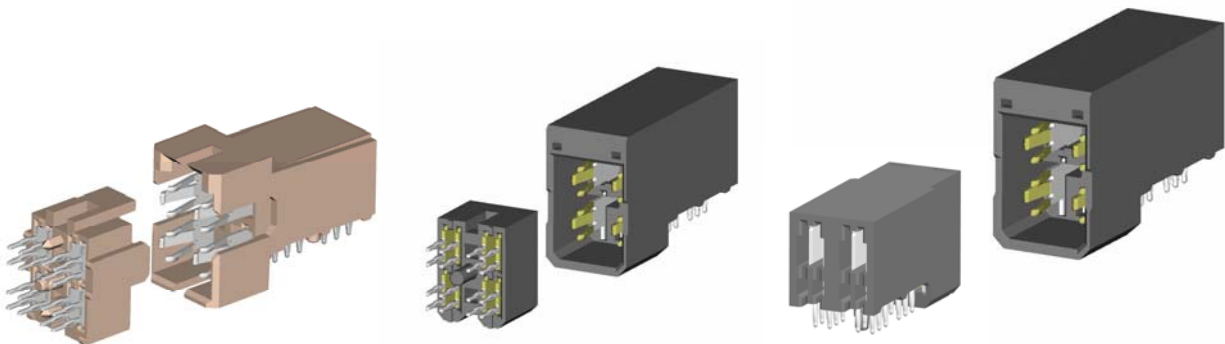


Figure 1: 2mm High Power Connector System,


Metral™ High Power Configuration

AirMax™ Power Configuration

## 3. DRAWINGS AND APPLICABLE DOCUMENTS

- FCI Product Specification GS-12-220 (2mm High 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

\* IEC 60950-1 contains the same information as UL 60950

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 3 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

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. **CONNECTOR CONFIGURATIONS**

Product Version	Header Contact Configurations		Receptacle Contact Configurations
Metral™ High Power (FutureBus) Version	2 X 2 (figure 2)	1 X 2 (figure 3)	2 X 2 (figure 4)
AirMax™ Power (Hard Metric) Version	2 X 2 (figure 5)	1 X 2 (figure 6)	2 X 2 (figure 7 & 8)

- 2mm High Power receptacles are offered only in a vertical 2x2 configuration which mates to either header type. Appropriate backpanel trace layout is required to connect adjacent receptacle contacts as required.
- Each of the two 1x2 header contacts have 7 press-fit tails while each of the four 2x2 header contacts has 3 press-fit tails. See applicable figures.

The compliant press-fit tails provide a reliable electrical connection between the receptacle and the plated through hole (PTH) of the PCB. Press-fit tails eliminate the need for solder-processing of through-board solder tails, although the product can withstand the peak temperatures of 260°C for up to 60 seconds found in typical solder-reflow processes used for other PCB components. Press-fit technology simplifies rework of assembled boards by allowing a damaged connector to be pressed out and replaced.

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 4 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

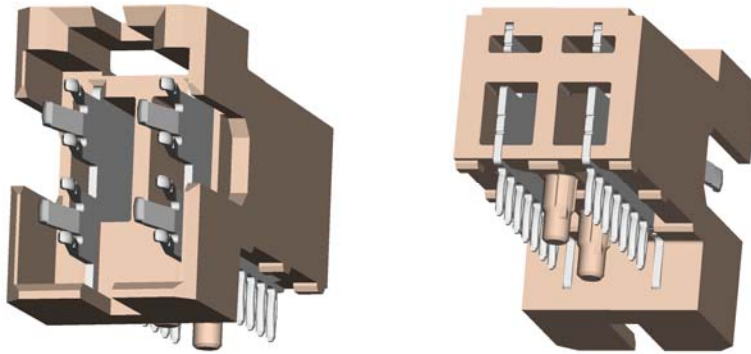


Figure 2: Metral™ High Power 1x2 Header

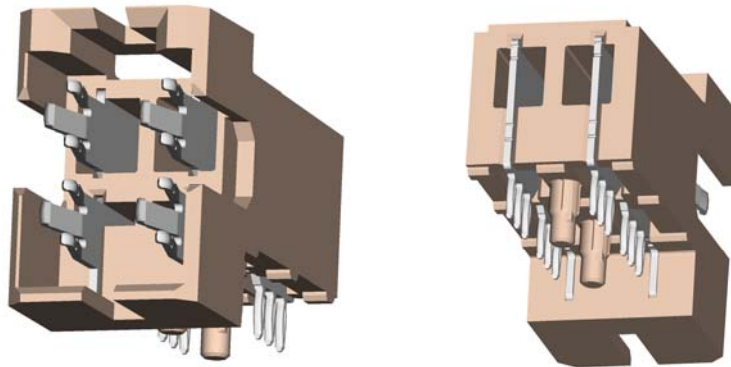


Figure 3: Metral™ High Power 2x2 Header

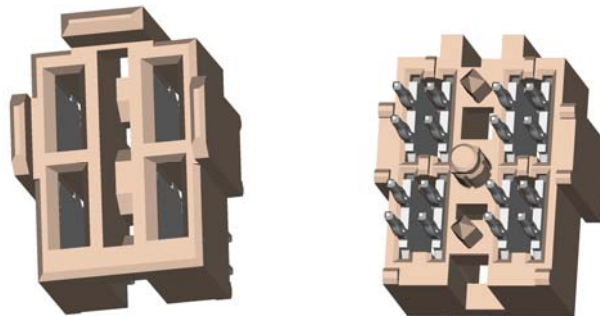
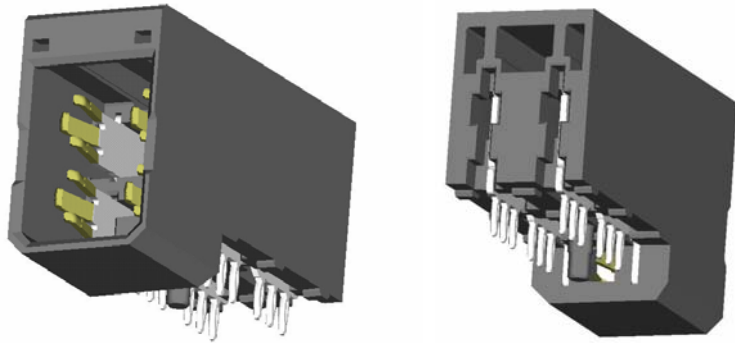
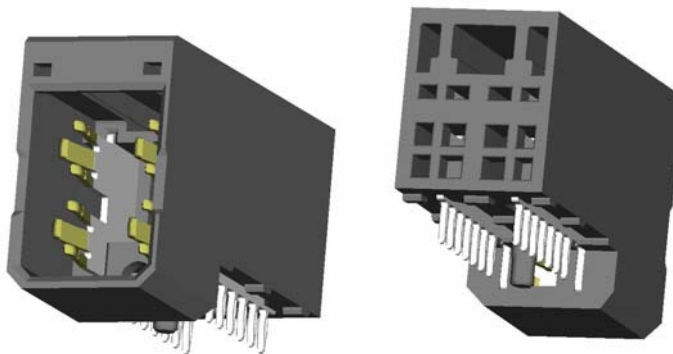


Figure 4: Metral™ High Power Receptacle

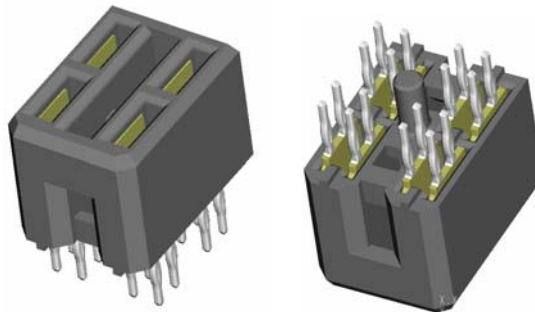
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 5 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			




**Figure 5: AirMax™ Power 2x2 Header**



**Figure 6: AirMax™ Power 1x2 Header**



**Figure 7: AirMax™ Power Vertical 2x2 Receptacle**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 6 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

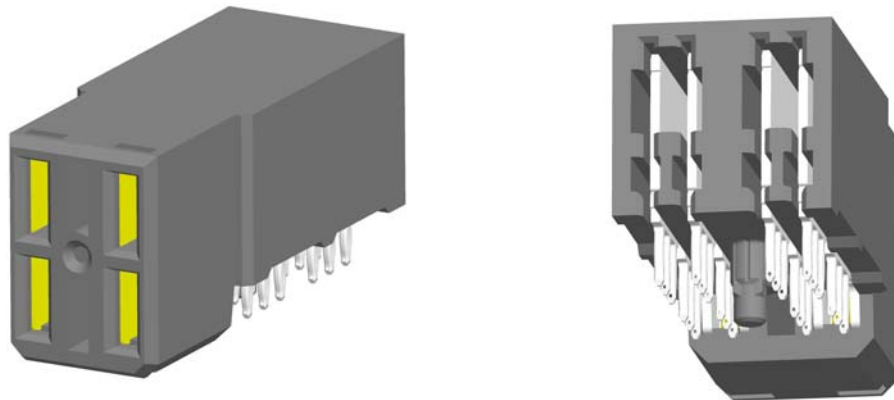


Figure 8: AirMax™ Power R/A 2x2 Receptacle

## 4.2. COMPATIBILITY

### 4.2.1 Metral™ High Power


Metral High Power module width, height, and depth are compatible with Standard and 1000/2000 Series Metral right angle connector assemblies. There are two available mating lengths and associated wipe distances, which are controlled by changing the receptacle contact length. These mating lengths and wipe distances are equal to those of Standard Metral long and medium header pins (8.0mm and 6.5mm) mated to Standard Metral receptacles.

### 4.2.2 AirMax™ Power

Hard Metric Power module card-to-backplane mating distance is compatible with standard Millipacs and AirMax VS connector series in the hard metric format. There are two available mating lengths and associated wipe distances, which are controlled by changing the receptacle contact length.

### 4.2.3 Lead-free Processing

While the products referenced in this specification are not solder-processed, other components on the PCB may be. 2mm High Power 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.

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 7 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

### 4.3. MATING ALIGNMENT

#### 4.3.1 Metral™ High Power

When several Metral™ High Power connectors are placed adjacent to one another, the guiding system will correct a nominal misalignment of +/- 1.5mm in the direction perpendicular to the daughter card and +/- 1.5mm in the direction parallel to the daughter card.

However, when a Metral™ High Power header is placed adjacent to a Metral™ signal receptacle, the mating Metral™ signal header must have a 0.5mm lead-in chamfer on the shroud tips to assist in guiding. Without such a chamfer on the signal header shroud, the Metral™ High Power guiding system will only account for a +/- 1.0mm nominal misalignment in the direction parallel to the daughter card.

*NOTE: It is strongly recommended that separate guiding modules be used, especially with larger daughter cards, due to the possible dangerous and/or costly system effects associated with improperly mating any power connector.*

#### 4.3.2 AirMax™ Power

The AirMax™ Power connector is designed for use with a separate guide module (reference FCI **Application Spec GS-20-045**). Without separate guidance, the header and receptacle centers can be misaligned a maximum of 0.8mm in any direction and still mate properly.

### 4.4. CONTACT WIPE DISTANCES

The table below shows NOMINAL contact wipes distance for Airmax Power Backpanel and Coplanar product configurations. All values are at full normal force and do not include lead-in geometry on either mating half. All values assume there is no gap between connector mating faces. Please contact FCI engineering for tolerance information needed to calculate minimum contact wipe.

Product Configuration	Short receptacle contact (for last mate/first break) wipe length – L1 (mm)	Long receptacle contact (first mate/last break) wipe length – L2 (mm)
Backpanel receptacle	4	5.5
Coplanar	4	5.5

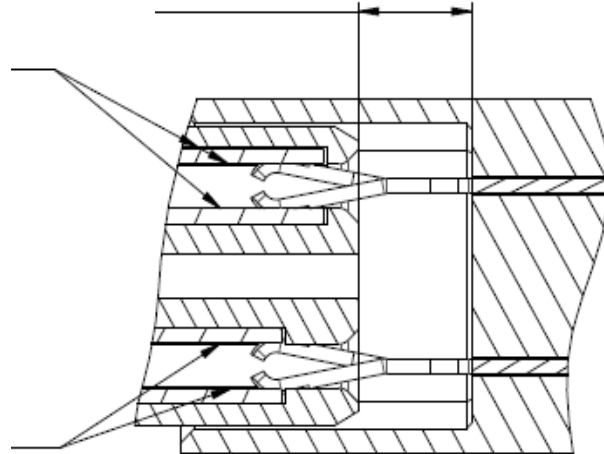
See below figure 9 layout for the wipe distance.

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 8 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

**WIPE LENGTH (Short receptacle contact )  
L1 = 4 mm**

LONG RECEPTACLE CONTACT  
FOR FIRST MATE / LAST BREAK

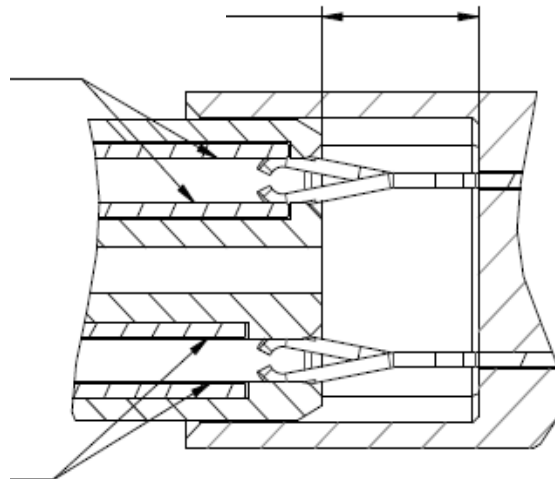
SHORT RECEPTACLE CONTACT  
FOR LAST MATE / FIRST BREAK



**WIPE LENGTH (Long receptacle contact)  
L2 = 5.5 mm**


LONG RECEPTACLE CONTACT FOR  
FIRST MATE/ LAST BREAK

SHORT RECEPTACLE CONTACT  
FOR LAST MATE / FIRST BREAK



**Figure 9:**  
Backplane receptacle & coplanar contact wipe distance – L1 & L2.



NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 9 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

#### 4.5. VOLTAGE RATING:

The 2mm High Power connector system is rated for a 150V maximum working voltage between any adjacent conductors per the requirements specified for secondary circuits in UL 60950 (formerly UL 1950), IEC 664-1, and IEC 61984. The 150V rating requires 1.6mm minimum creepage and clearance distances throughout the connector system given the following parameters:

- Pollution Degree: 2 (representative of a typical environment for electrical connectors)
- Insulation Type: Reinforced (R) – This type of insulation requires the largest clearance distances for a given Working Voltage and Pollution Degree
- Material Group 3 (The Comparative Tracking Index (CTI) for printed circuit board material is between 175 and 400 which requires Material Group 3 to be considered. This material group requires the largest creepage distances for a given Working Voltage and Pollution Degree.

#### 4.6. CURRENT RATING and DE-RATING:

(Refer to FCI Product Specification GS-12-220 for additional information)

Following are the current rating values for the 2mm High Power connector system in four different test configurations (perpendicular mating orientation):

Receptacle type	Number of columns fully powered	Copper Pad Weight	Max Current Per Contact	
			1x2 Header	2x2 Header
Vertical Receptacle (2 x 2)	2	5 oz	40A	20A
	Up to 10 adjacent	5 oz	32A	14A
	2	2 oz	32A	15A
	Up to 10 adjacent	2 oz	27A	12A
R/A Receptacle (2 x 2)	2	2 oz	37A	18A
	Up to 10 adjacent	2 oz	29A	14A

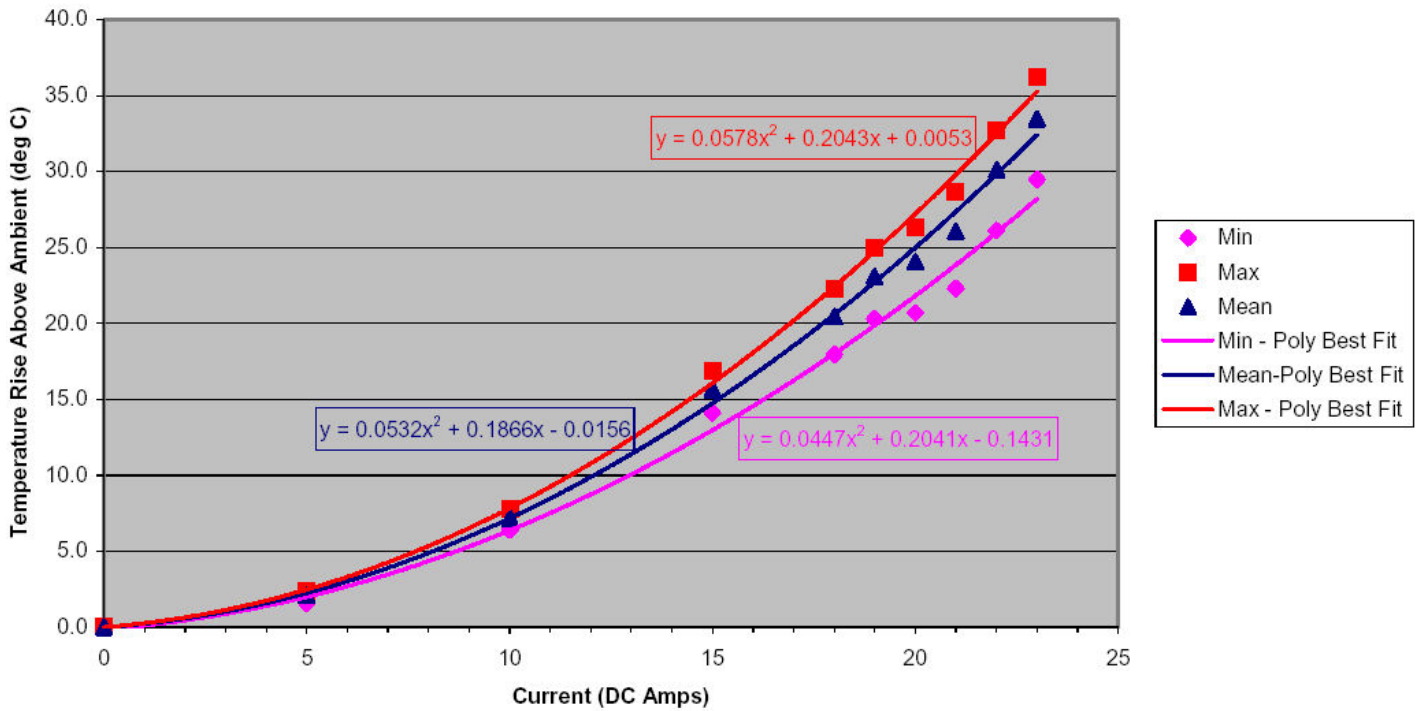
**Table 1:**  
Maximum current rating for a header mated to a receptacle

General test board details are as follows:

- **Header:**  
Dual (double sided) external copper pads of noted weight, approximate outline of connector.
- **Receptacle:**  
Dual (double sided) external copper pads of noted weight, approximate outline of connector.

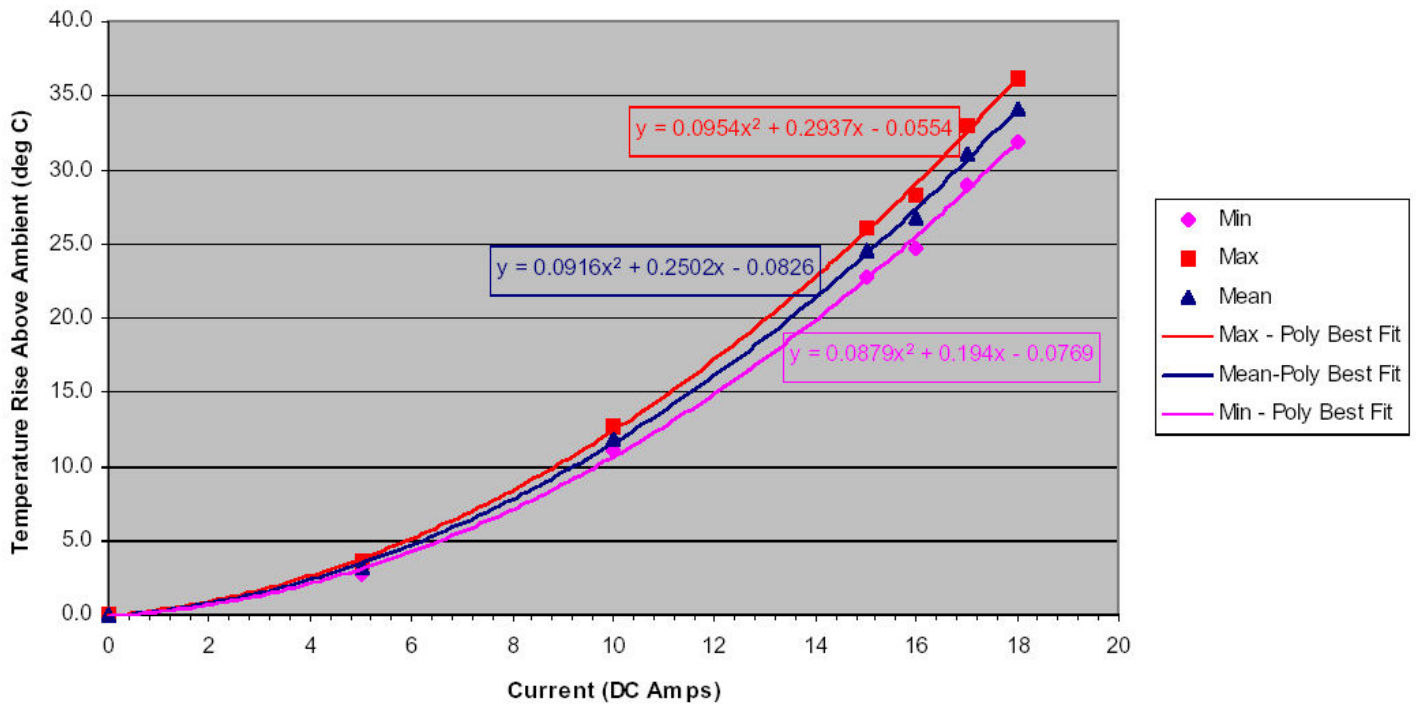
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 10 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

### 4.6.1 Current Rating Curves




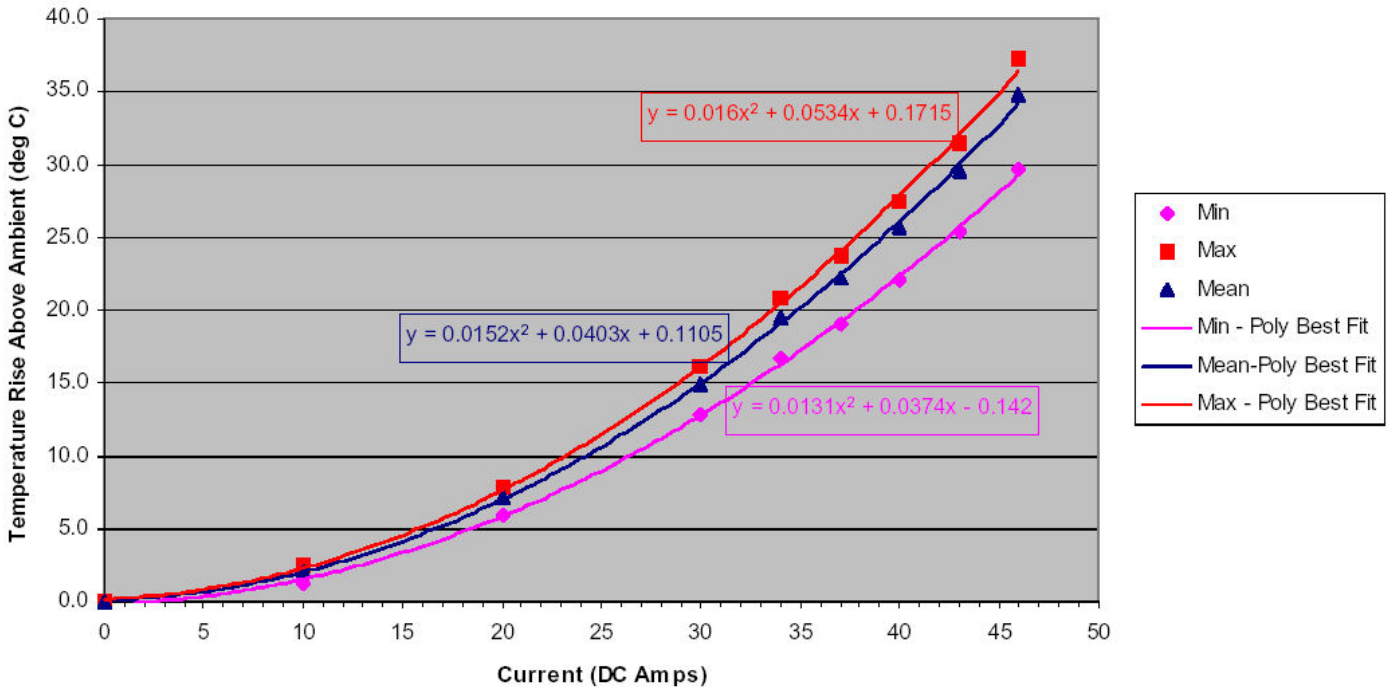
**Figure 10**  
Current versus Temperature-Rise  
2x2 Version, 5oz copper pads, Single Connector Module, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 11 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
		CLASSIFICATION <b>UNRESTRICTED</b>	



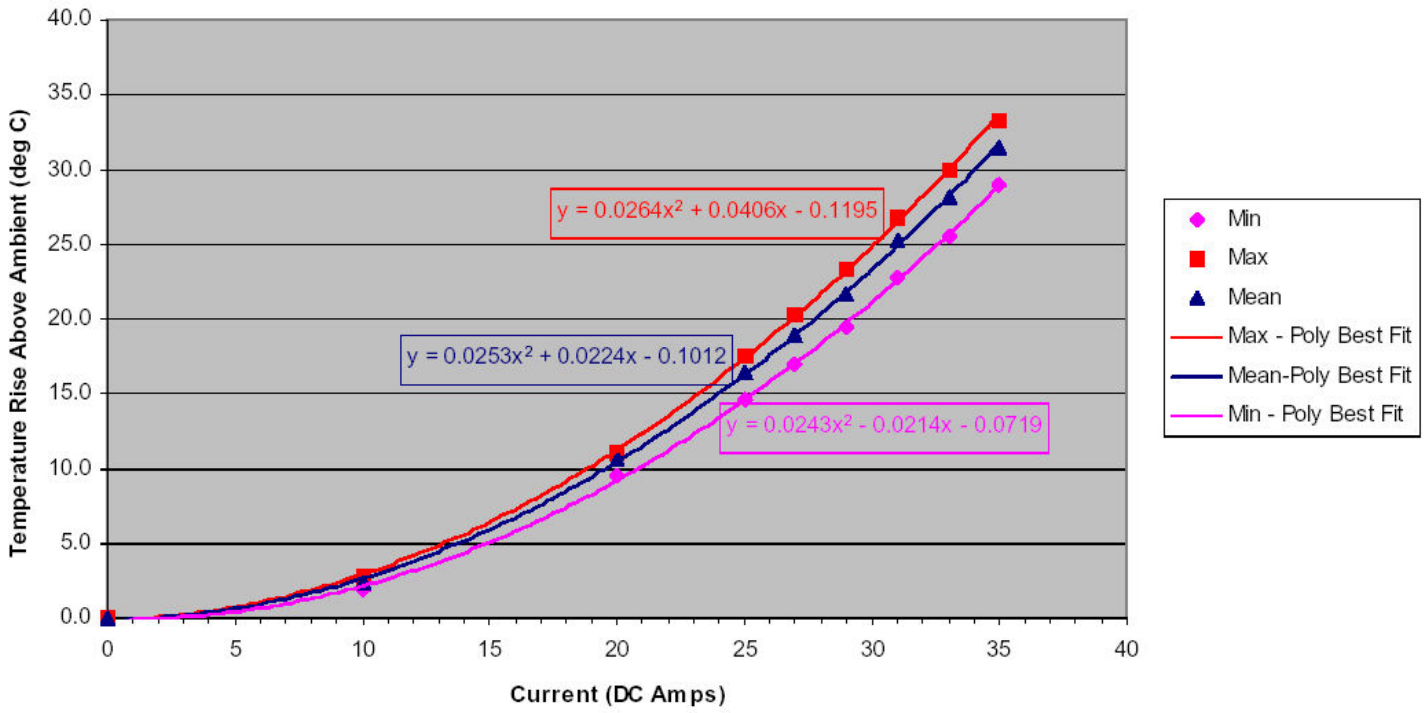
**Figure 11**  
 Current versus Temperature-Rise  
2x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
 Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 12 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



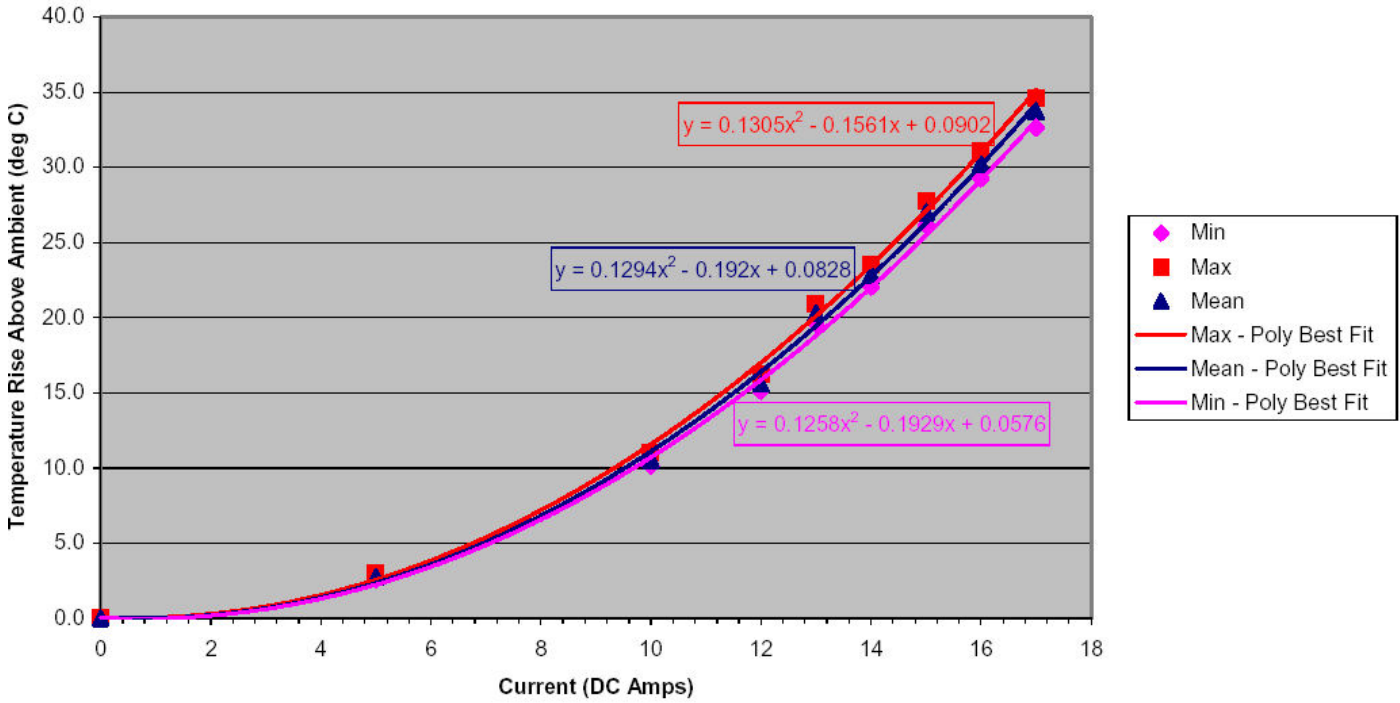
**Figure 12**  
 Current versus Temperature-Rise  
 1x2 Version, 5oz Copper Pads, Single Connector Module, All Contacts Energized  
 Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 13 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



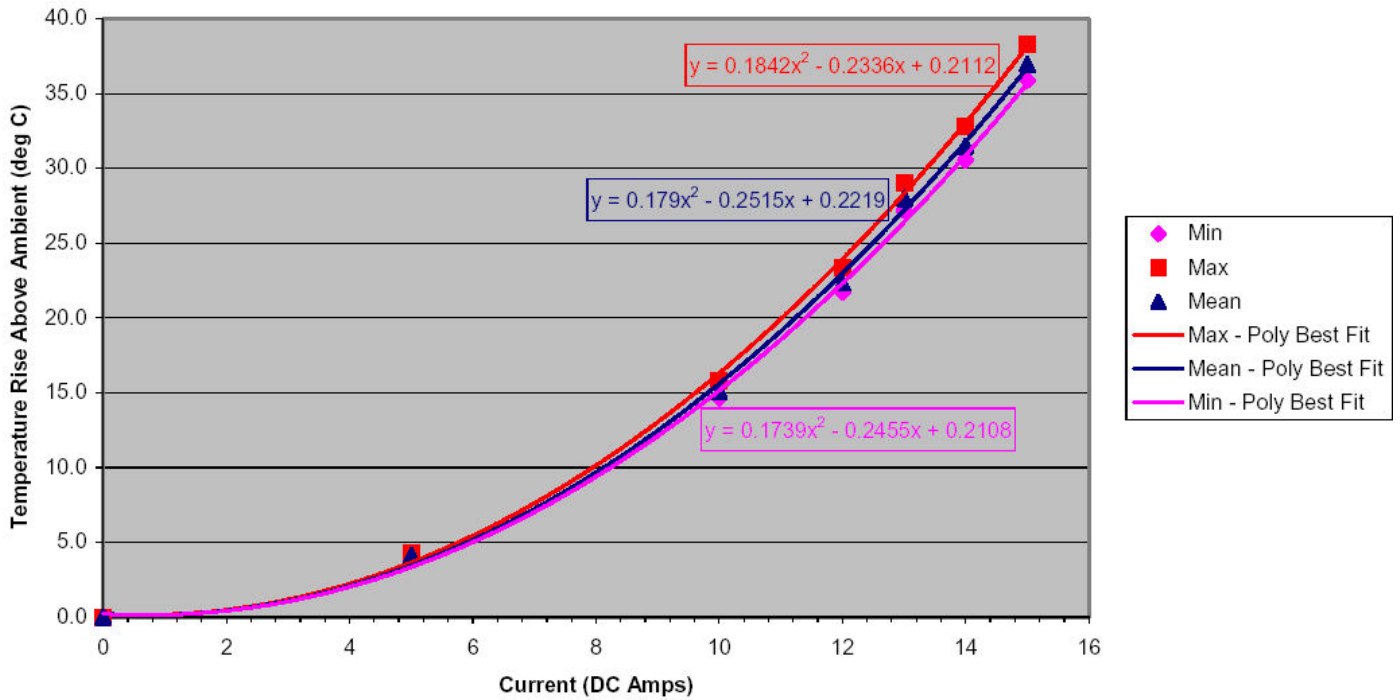
**Figure 13**  
 Current versus Temperature-Rise  
 1x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
 Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 14 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			




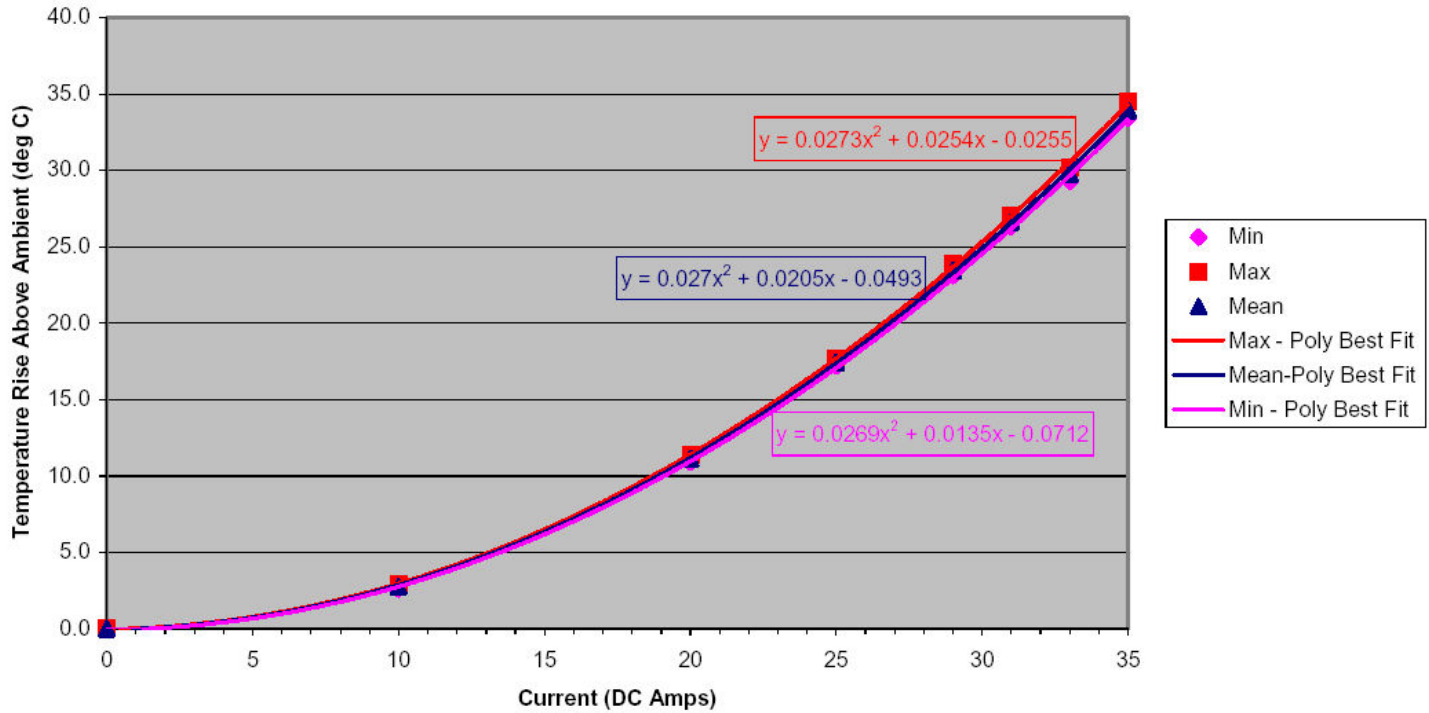
**Figure 14**  
 Current versus Temperature-Rise  
2x2 Version, 5oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 15 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



**Figure 15**  
 Current versus Temperature-Rise  
2x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Perpendicular Mating Configuration

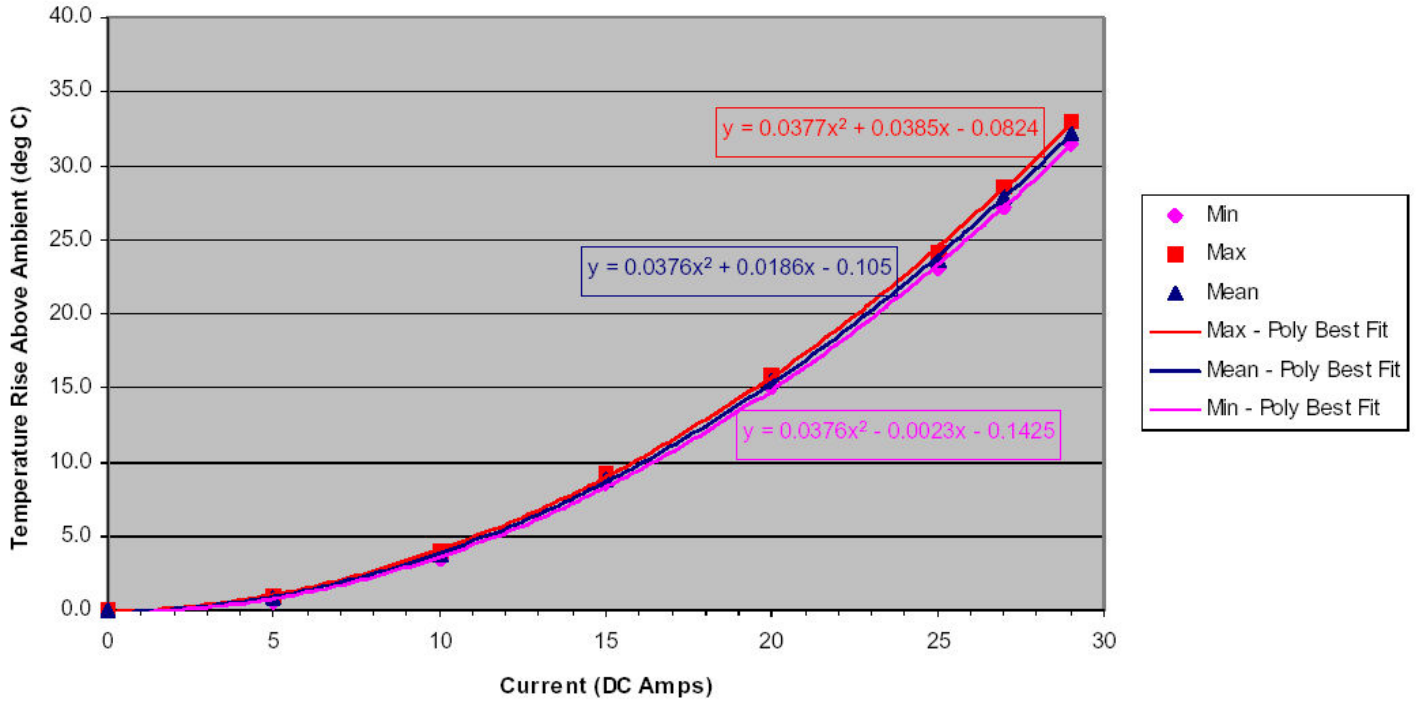
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 16 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



**Figure 16**  
 Current versus Temperature-Rise  
 1x2 Version, 5oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Perpendicular Mating Configuration

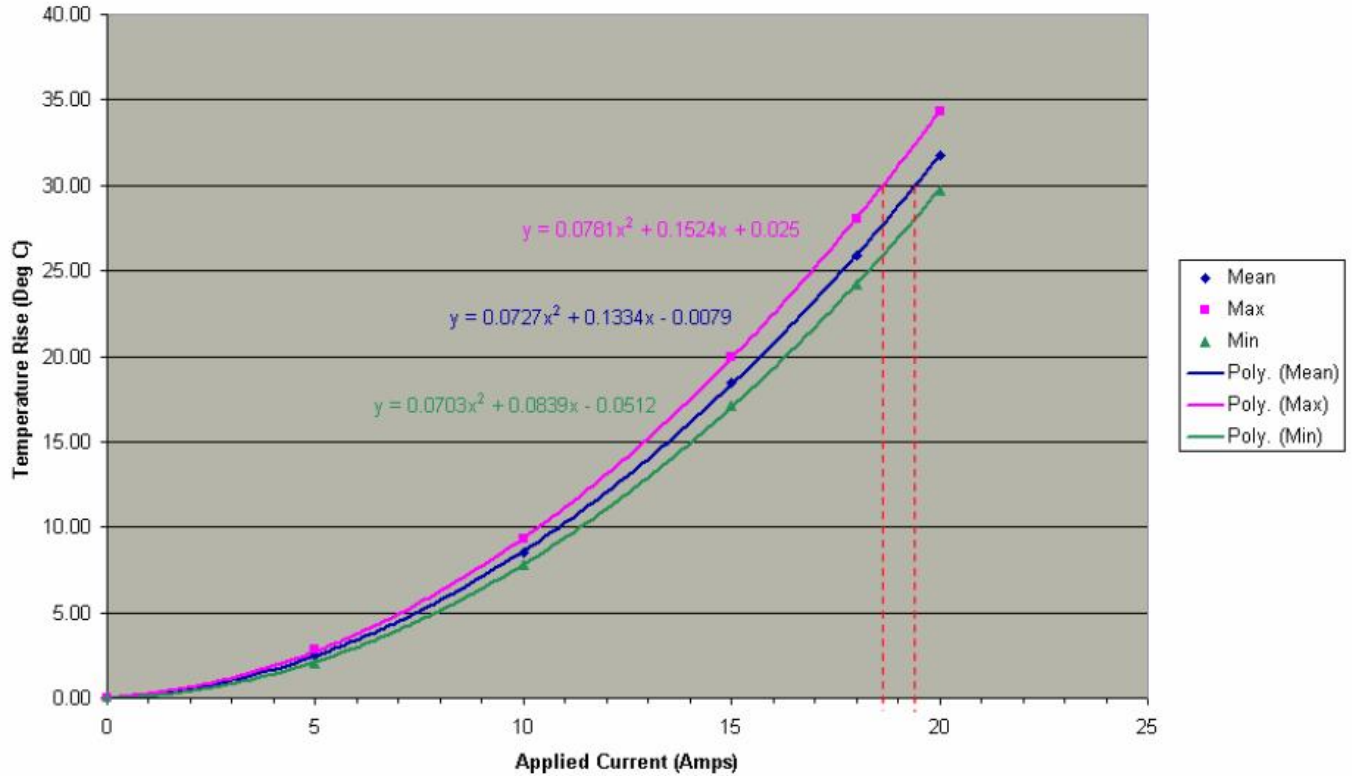


NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 17 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			




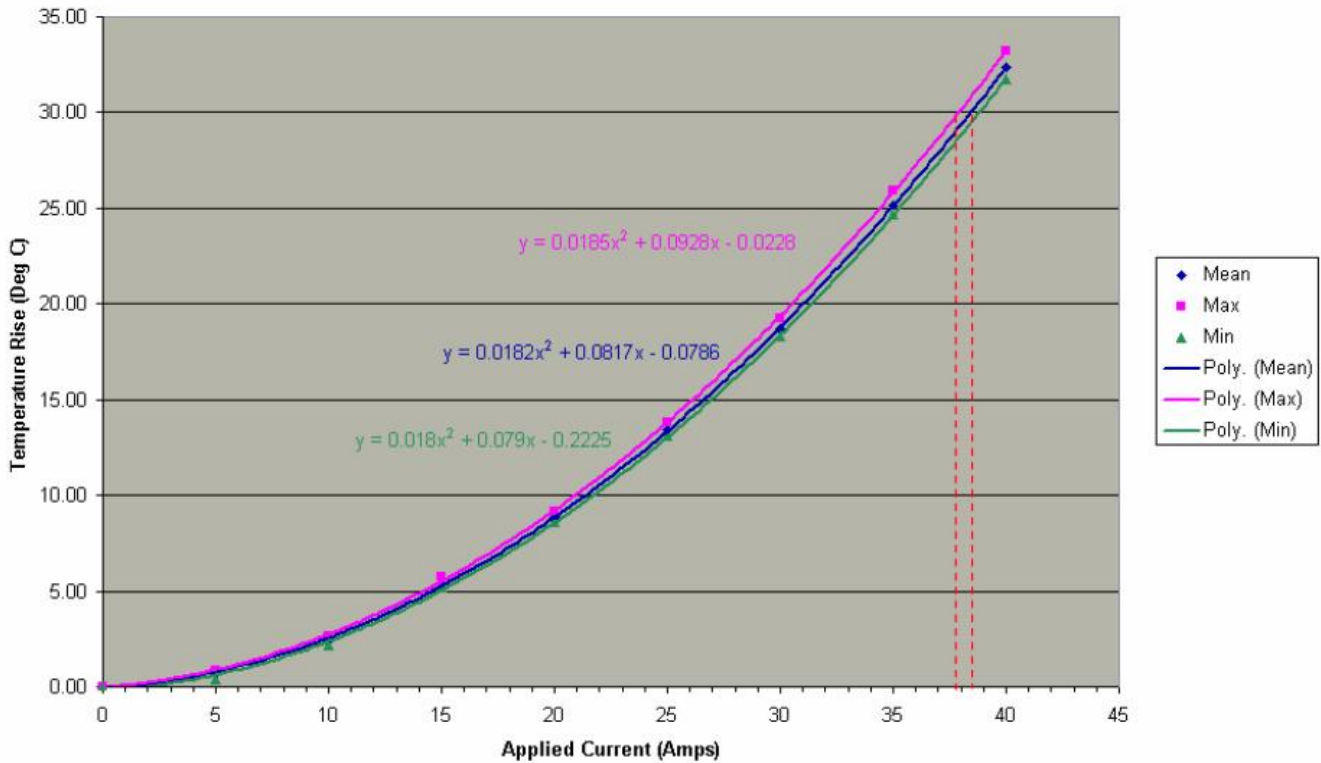
**Figure 17**  
 Current versus Temperature-Rise  
 1x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Perpendicular Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 18 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



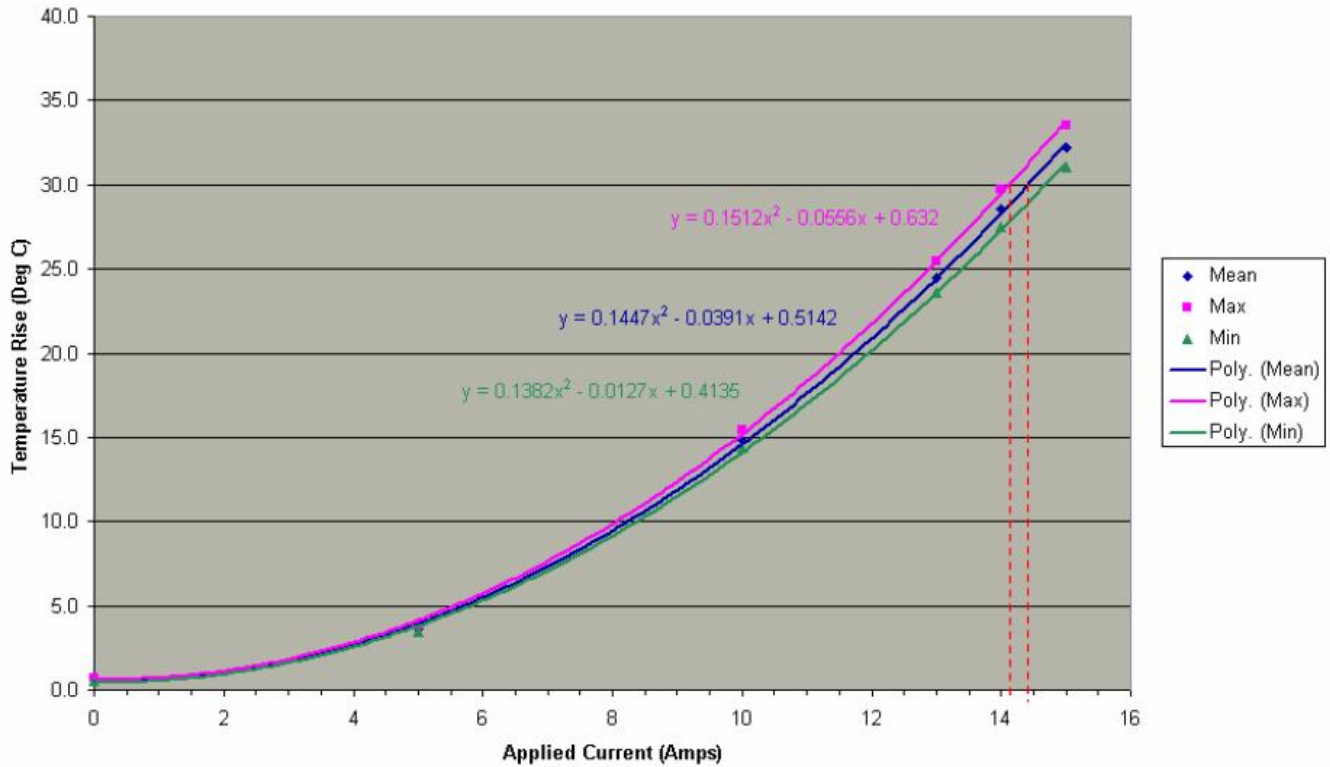
**Figure 18**  
 Current versus Temperature-Rise  
2X2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
 Coplanar Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 19 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



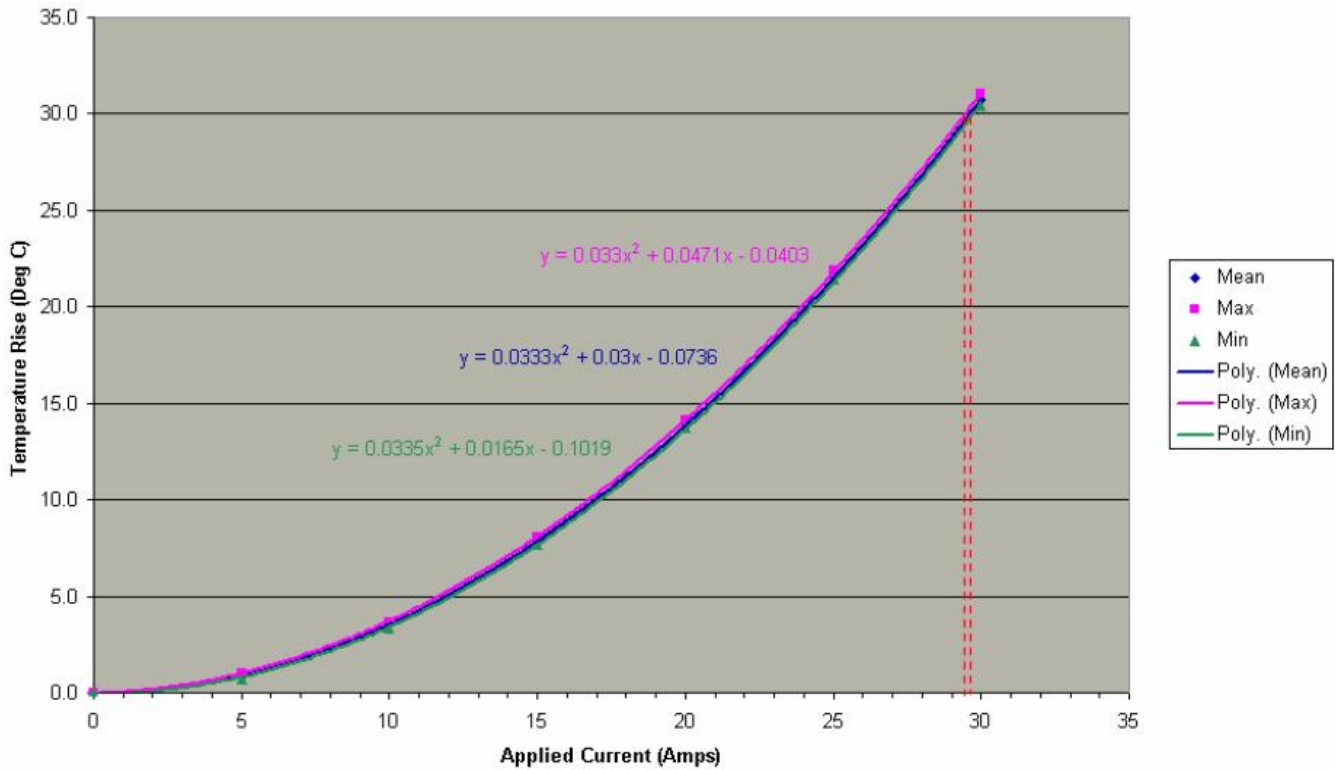
**Figure 19**  
 Current versus Temperature-Rise  
1x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
 Coplanar Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 20 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			



**Figure 20**  
 Current versus Temperature-Rise  
2x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Coplanar Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 21 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

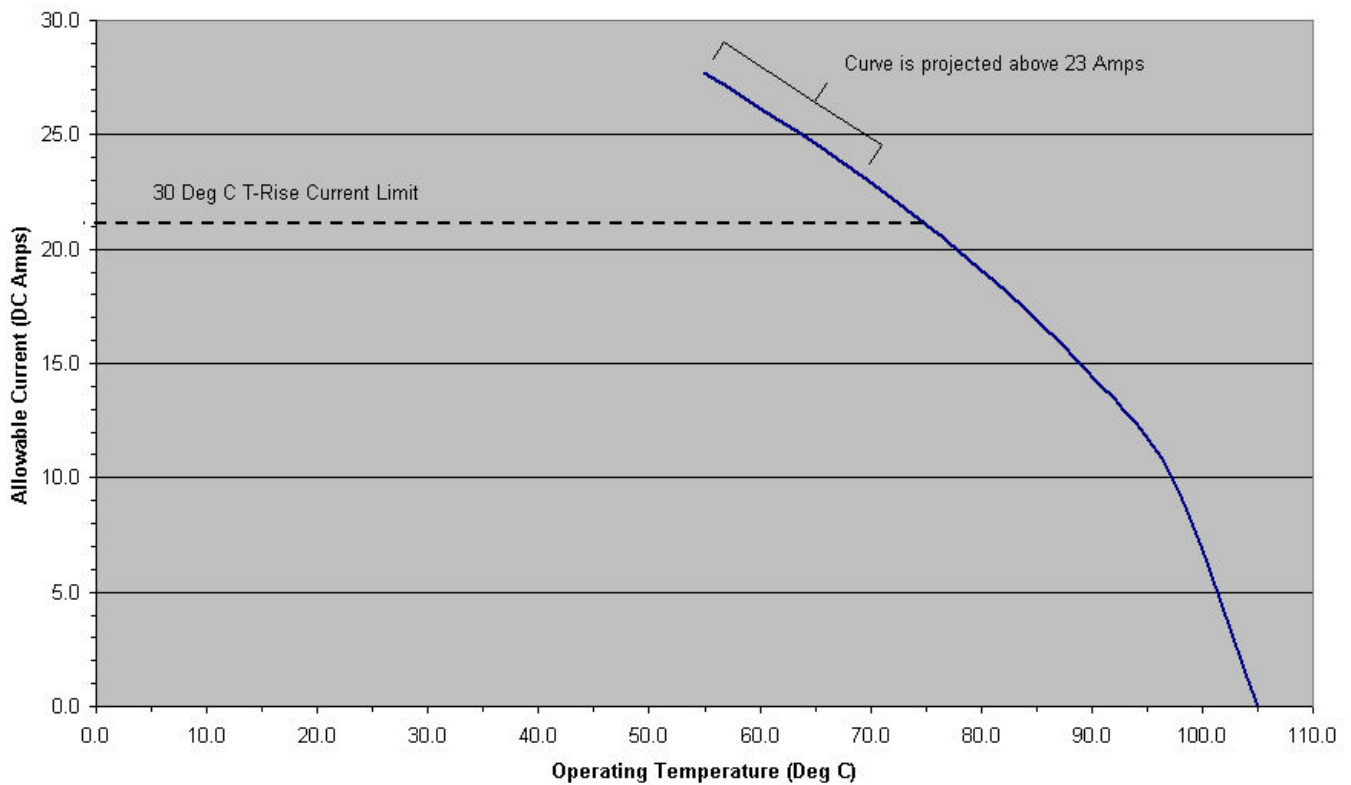


**Figure 21**  
 Current versus Temperature-Rise  
1x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
 Coplanar Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 22 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
		CLASSIFICATION <b>UNRESTRICTED</b>	

### 4.6.2 Current De-Rating Curves Based on Ambient Temperature

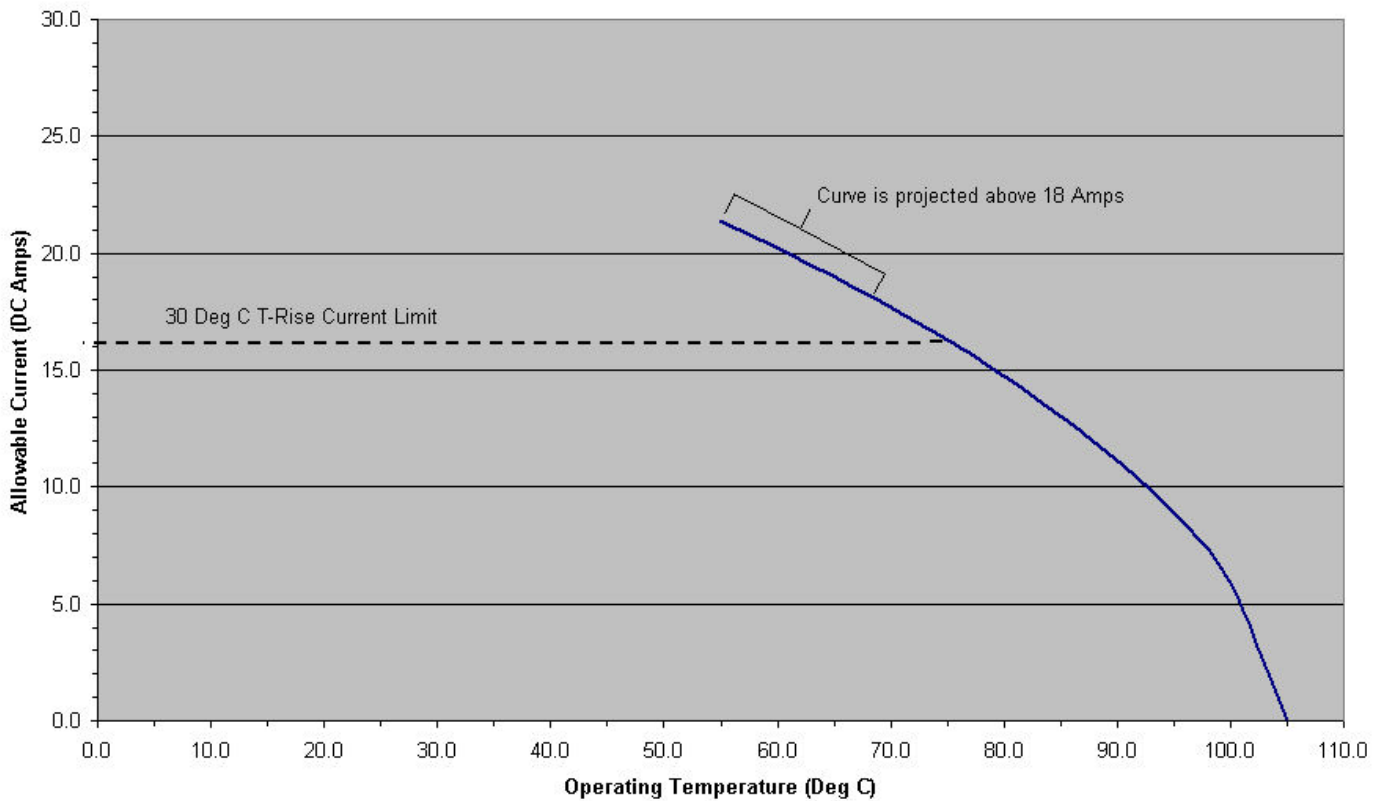
Single Connector Module, All Contacts Energized, 5 oz Copper Pads



**Figure 22**  
De-rating Curve, 2x2 Version, 5oz copper pads, Single Connector Module, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>23 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

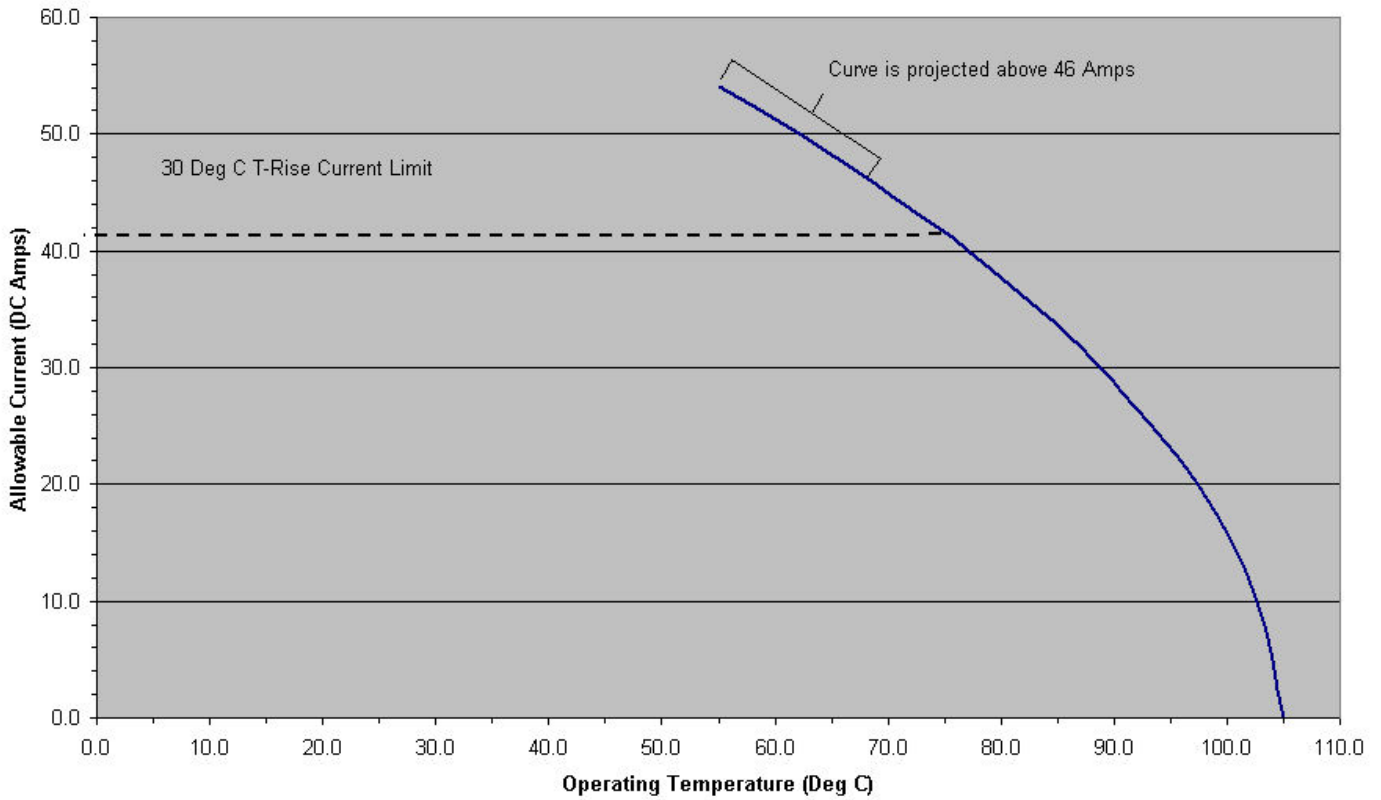
**Single Connector Module, All Contacts Energized, 2 oz Copper Pads**



**Figure 23**  
De-rating Curve, 2x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>24 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

**Single Connector Module, All Contacts Energized, 5 oz Copper Pads**

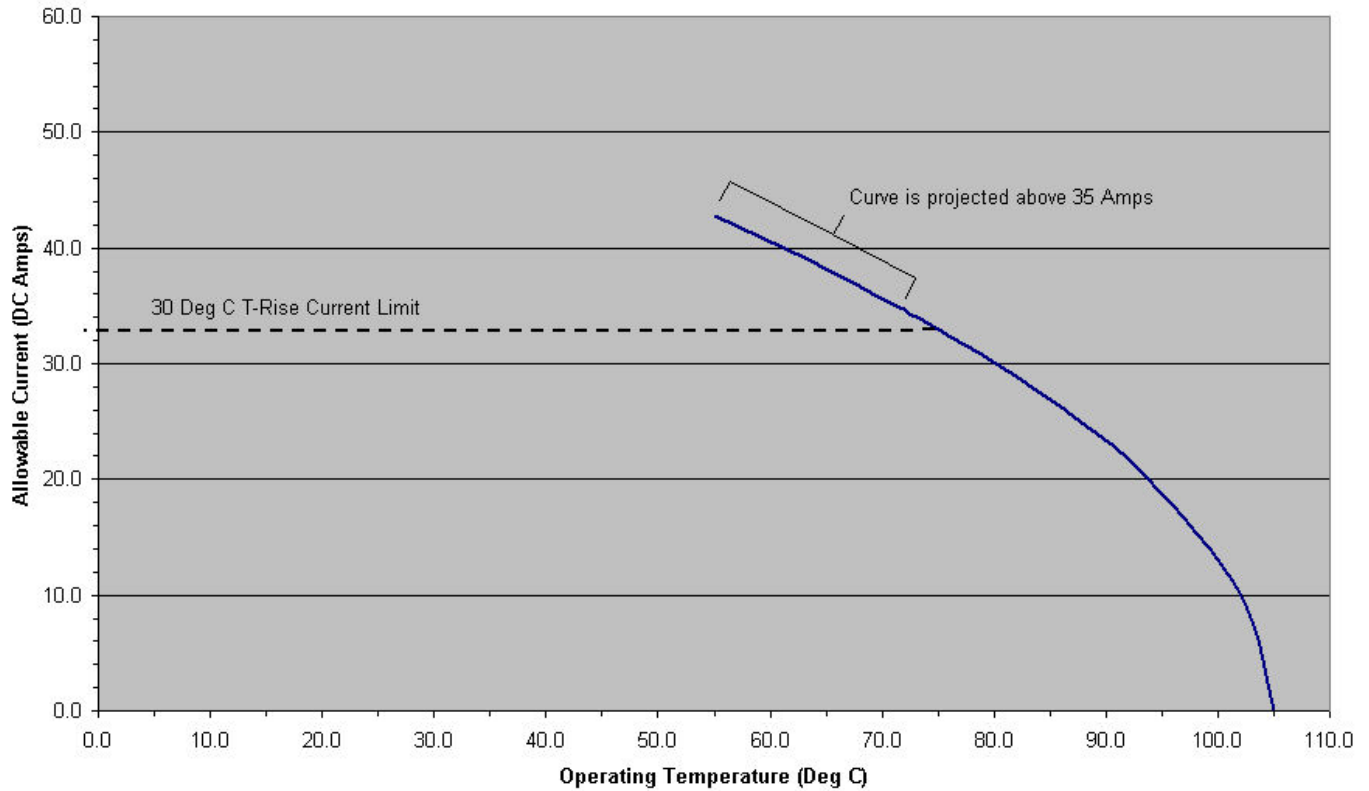


**Figure 24**  
De-rating Curve, 1x2 Version, 5oz Copper Pads, Single Connector Module, All Contacts Energized  
Perpendicular Mating Configuration



NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>25 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

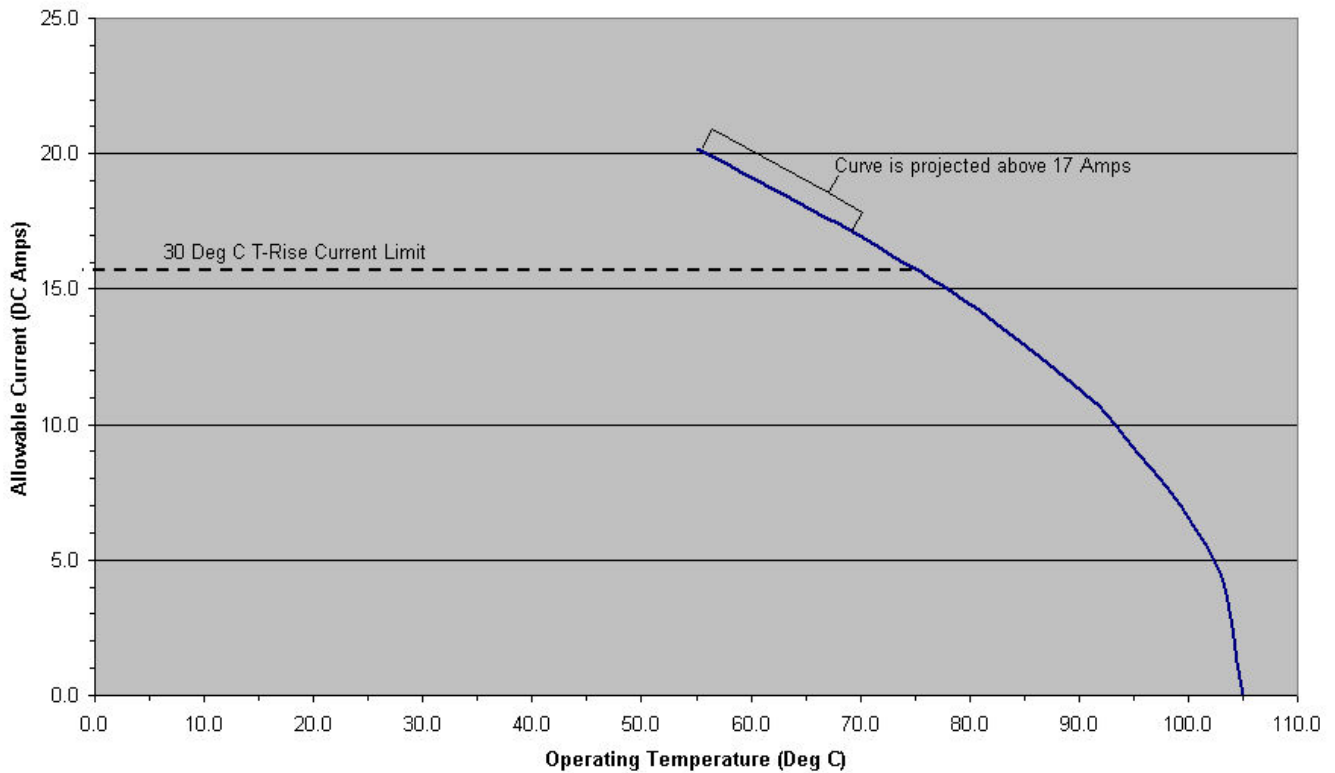
**Single Connector Module, All Contacts Energized, 2 oz Copper Pads**



**Figure 25**  
De-rating Curve, 1x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>26 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

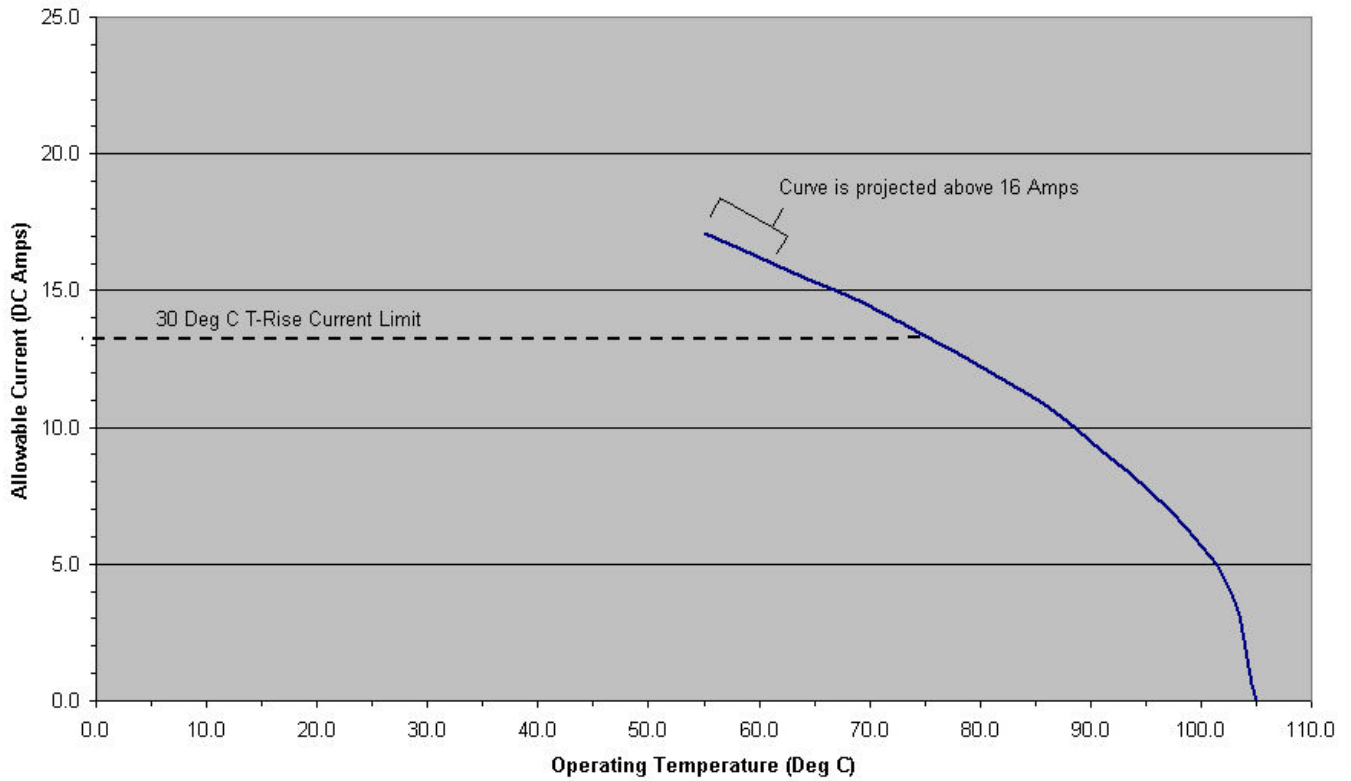
**5 Adjacent Connector Modules, All Contacts Energized, 5 oz Copper Pads**



**Figure 26**  
De-rating Curve, 2x2 Version, 5oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>27 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

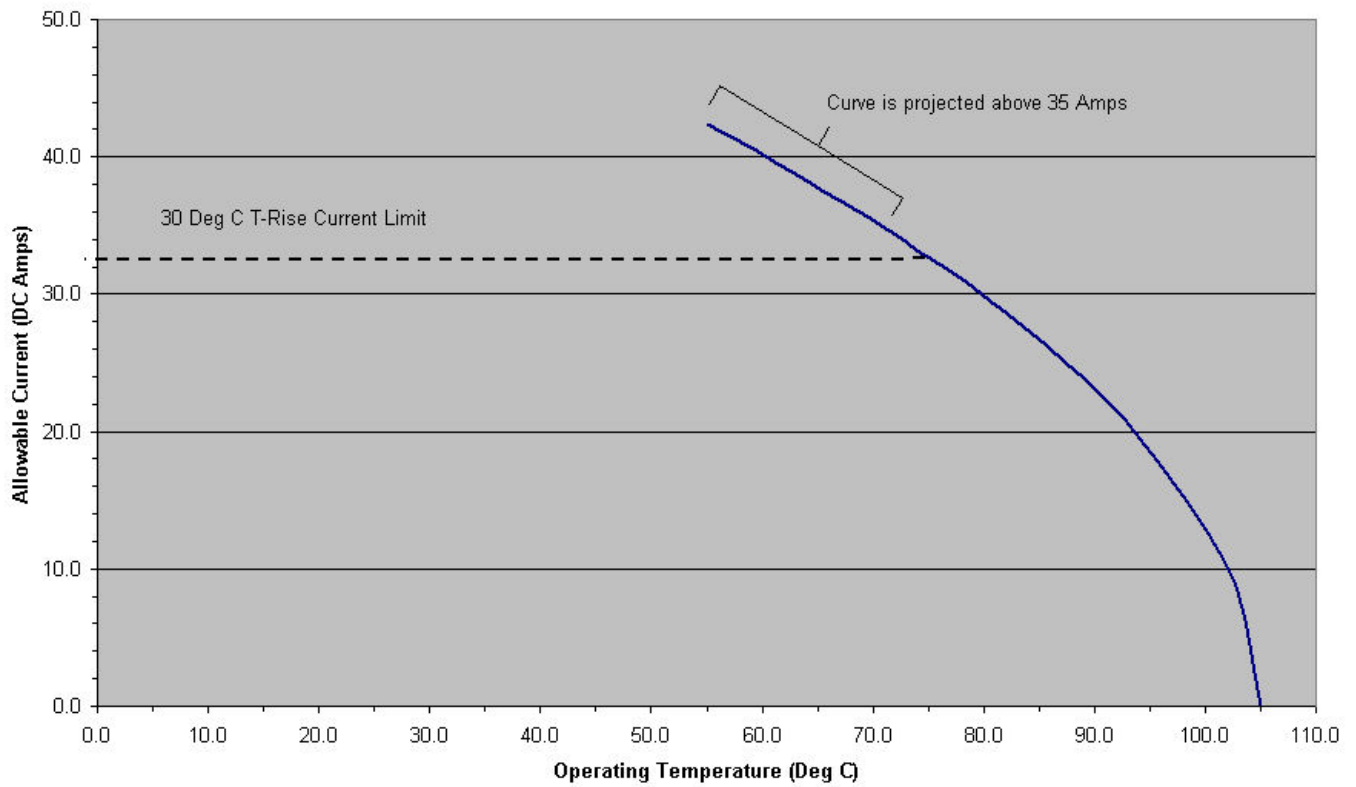
**5 Adjacent Connector Modules, All Contacts Energized, 2 oz Copper Pads**



**Figure 27**  
De-rating Curve, 2x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>28 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

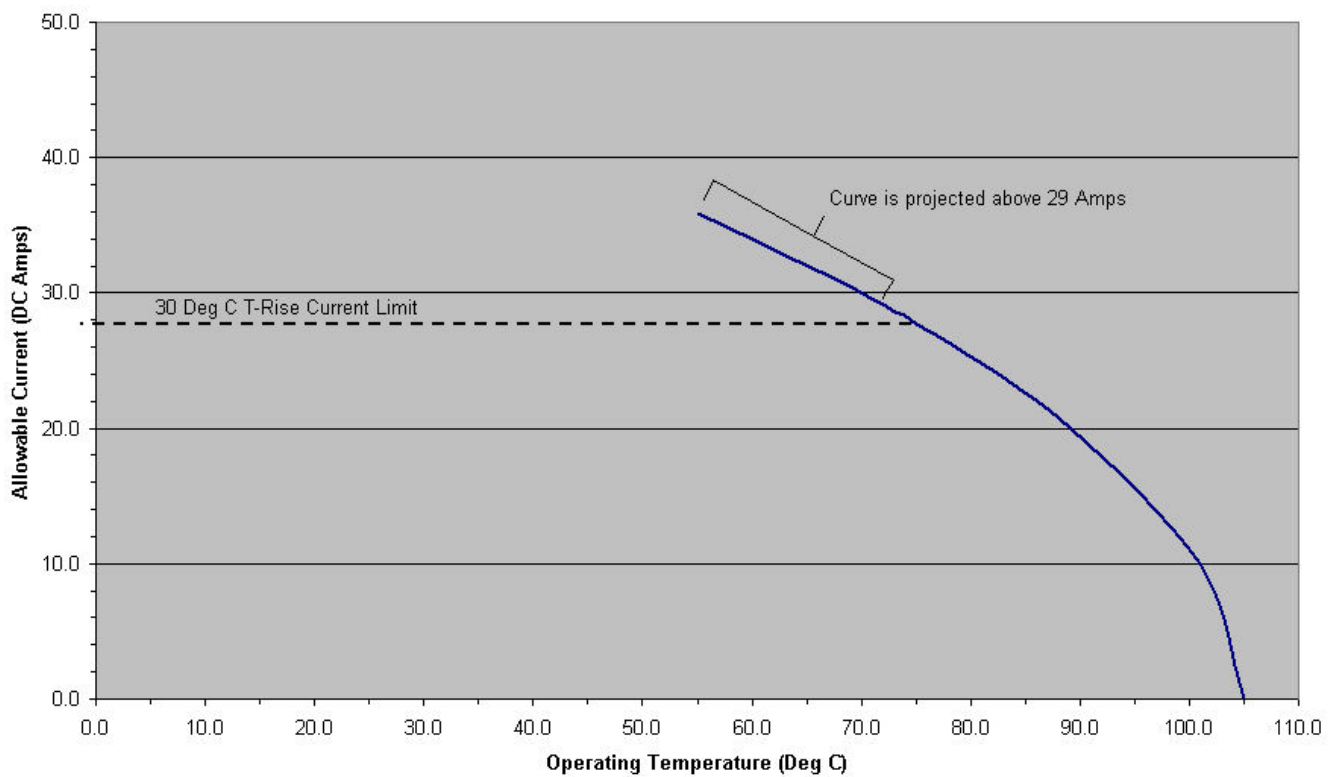
**5 Adjacent Connector Modules, All Contacts Energized, 5 oz Copper Pads**



**Figure 28**  
De-rating Curve, 1x2 Version, 5oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>29 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

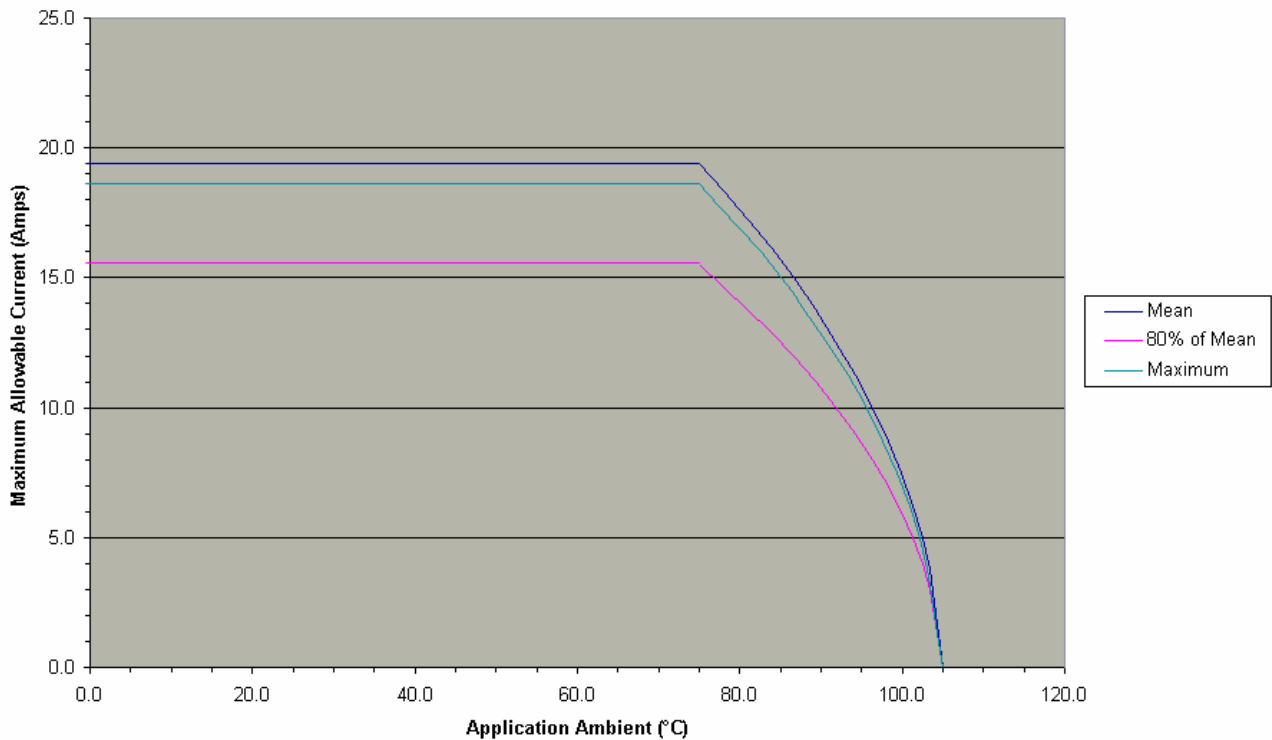
**5 Adjacent Connector Modules, All Contacts Energized, 2 oz Copper Pads**



**Figure 29**  
De-rating Curve, 1x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
Perpendicular Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>30 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

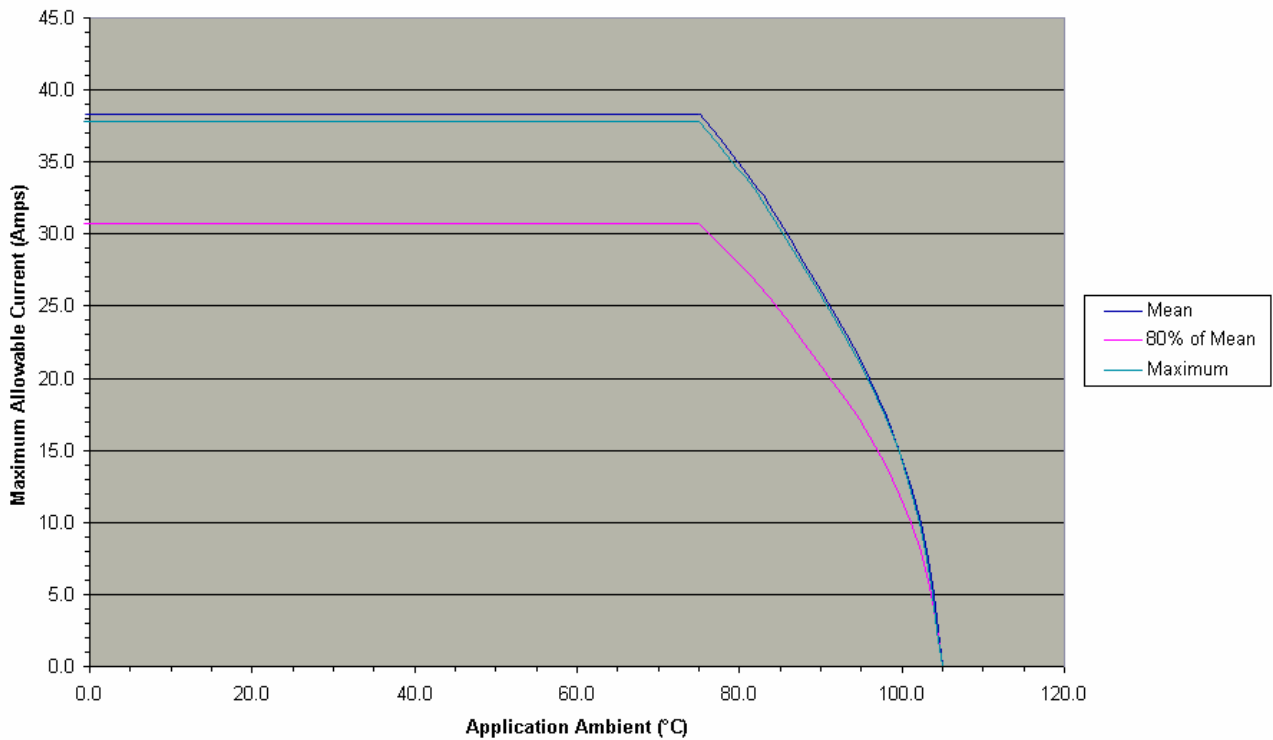
**EL-2005-08-025 AIRMAX® COPLANAR POWER  
2x2 Single Connector Test, 2 oz Copper**



**Figure 30**  
De-rating Curve, 2x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
Coplanar Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>31 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
CLASSIFICATION <b>UNRESTRICTED</b>			

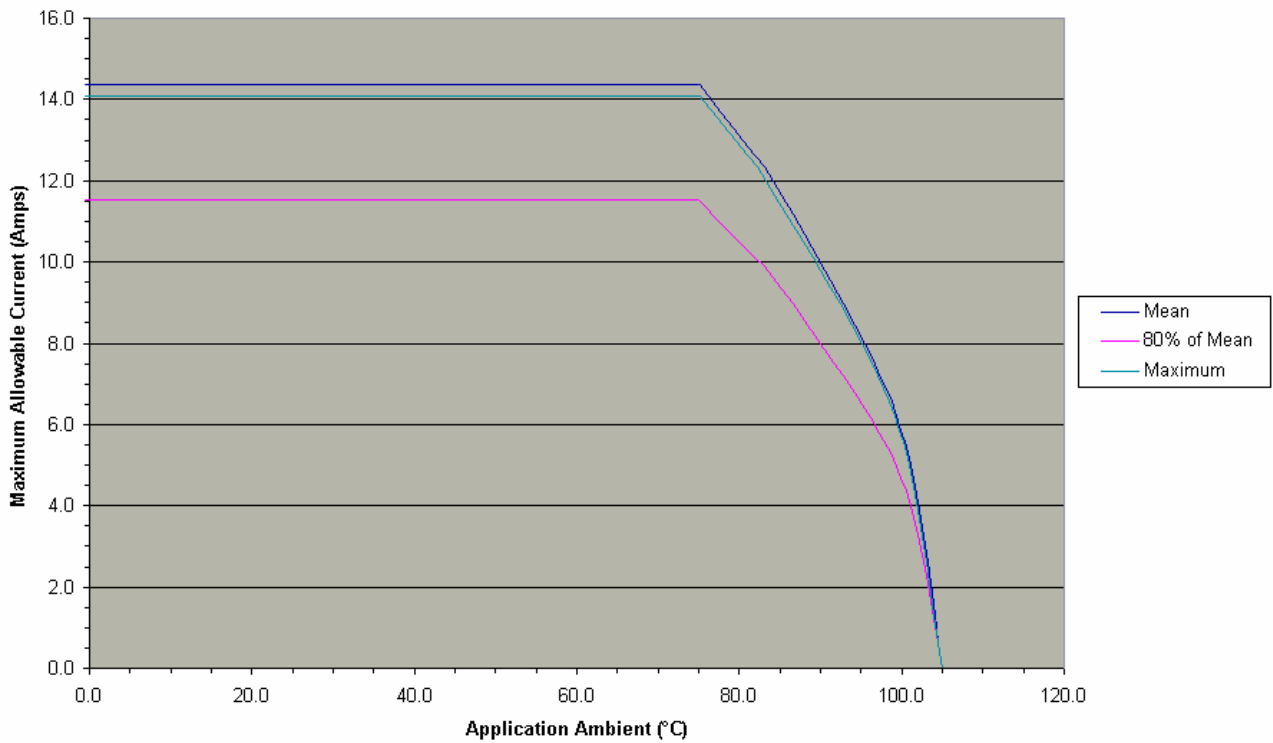
**EL-2005-08-025 AIRMAX® COPLANAR POWER  
1x2 Single Connector Test, 2 oz Copper**



**Figure 31**  
De-rating Curve, 1x2 Version, 2oz Copper Pads, Single Connector Module, All Contacts Energized  
Coplanar Mating Configuration

NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>32 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

**EL-2005-08-025 AIRMAX® COPLANAR POWER  
2x2 Fully Loaded Board Test, 2 oz Copper**

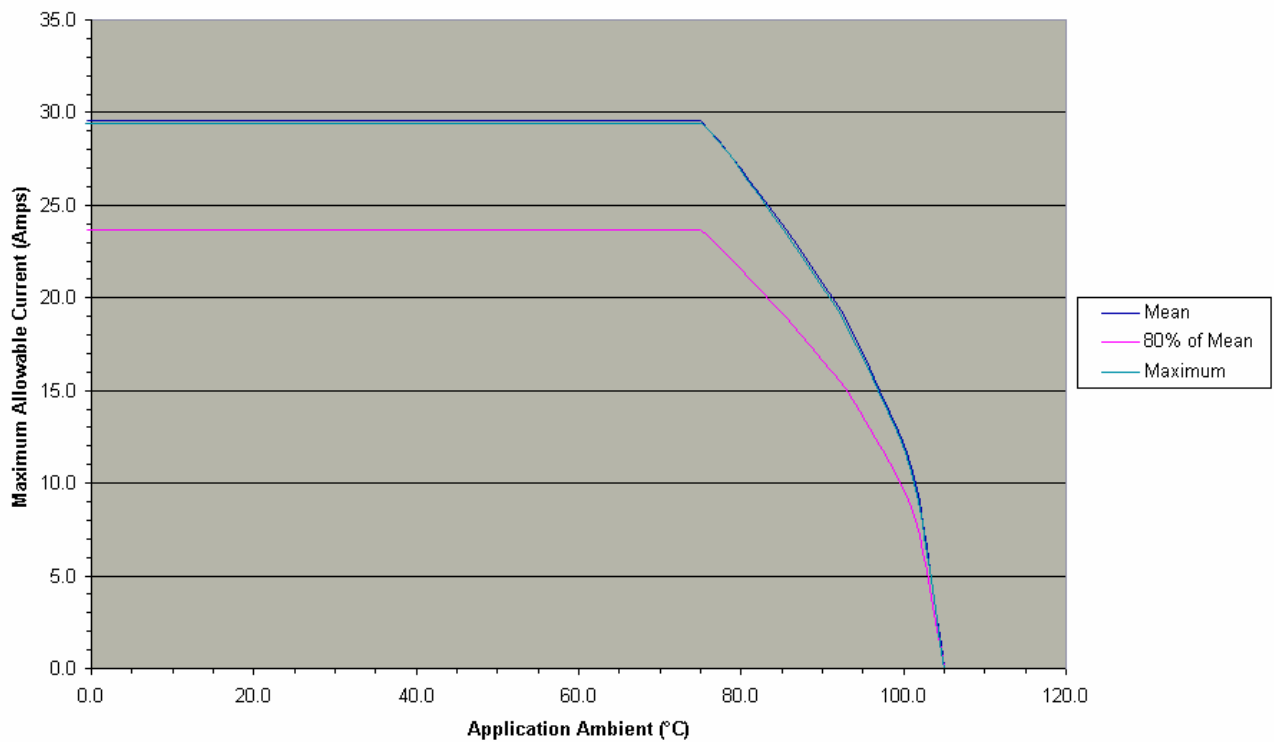


**Figure 32**  
De-rating Curve, 2x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized  
Coplanar Mating Configuration




NUMBER <b>GS-20-023</b>	TYPE <b>APPLICATION SPECIFICATION</b>	<b>FCI</b>	
TITLE <b>2mm High Power Press-fit Headers and Receptacles</b>		PAGE <b>33 of 51</b>	REVISION <b>H</b>
		AUTHORIZED BY <b>Ngwe Lin Soe</b>	DATE <b>04 Apr 12</b>
		CLASSIFICATION <b>UNRESTRICTED</b>	

**EL-2005-08-025 AIRMAX® COPLANAR POWER  
1x2 Fully Loaded Board Test, 2 oz Copper**



**Figure 33**  
De-rating Curve, 1x2 Version, 2oz Copper Pads, 5 Adjacent Connector Modules, All Contacts Energized Coplanar Mating Configuration

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 34 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

#### 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 three probes are referred to as follows:

- **Test Finger** (defined in Figure 2A of both specifications)
- **Test Pin** (Figure 2B)
- **Test Probe** (Figure 2C)

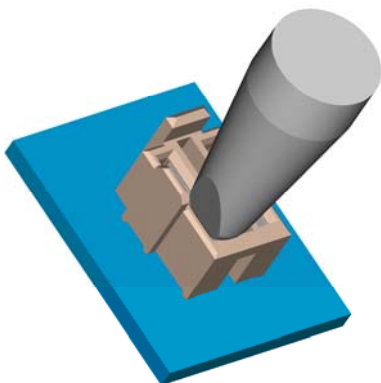
The following sections show each of these test probes positioned as closely as possible to the mating side contacts of the Metral High Power receptacle, which will be located on the backplane and may be powered in an unmated state\*. *The figures are representative of both the **Metral™ High Power** and **AirMax™ Power** connector versions.*

In addition, all **AirMax™ Power** versions are designed such that the rear of the right angle header contact is also comfortably protected from contact with the noted test probes.

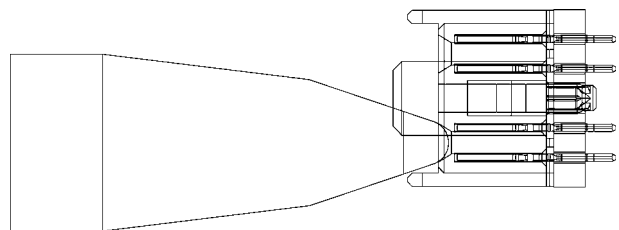
\* **Although the 2mm High Power connector system meets these probe requirements as noted, it is not recommended that the customer “hot plug” the header to the receptacle.**

##### 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 representative 2mm High Power receptacle capture window, showing that it is impossible for the probe (shown at the smallest size per specified tolerances) to touch the receptacle contacts.



**Fig. 34a -- 3D image of Test Finger relative to representative receptacle**



**Fig. 34b -- Section view of minimum sized Test Finger inserted into receptacle capture windows**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 35 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

#### 4.7.2. Test Pin

The **Test Pin** may not make contact with energized parts when applied to openings in an external electrical enclosure. Access doors and covers of the system enclosure are to remain closed for this test. **The backplane connectors will not be accessible given these conditions, so the 2mm High Power receptacle is not required to pass this probe test.** Nevertheless, to show the Test Pin size relative to the receptacle connector, the following 3D model was created. This model shows that under nominal conditions the probe was not able to touch the contacts in a representative 2mm High Power connector.

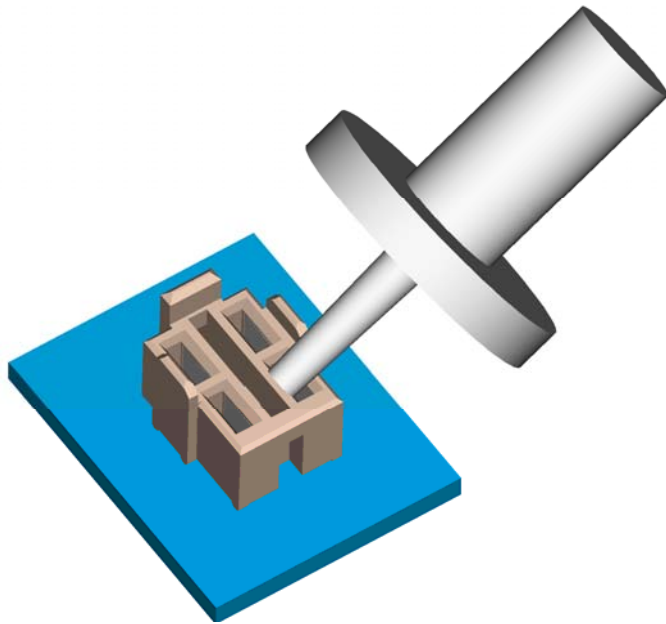


Figure 35a

3D image of Test Pin  
relative to a representative receptacle

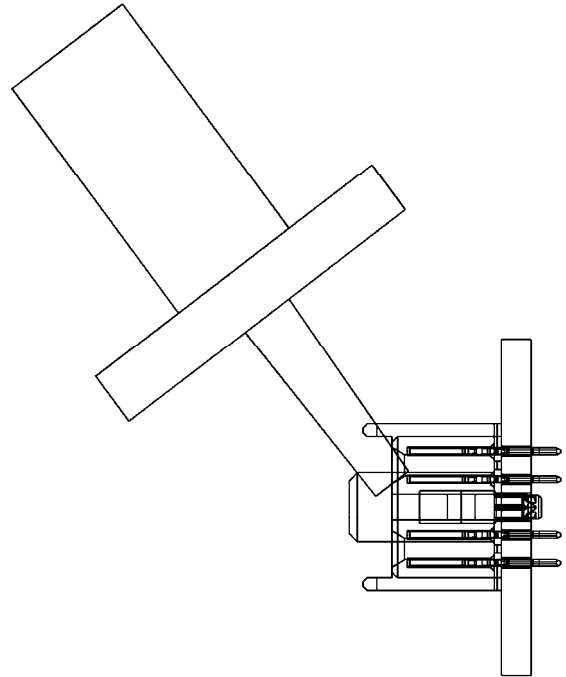



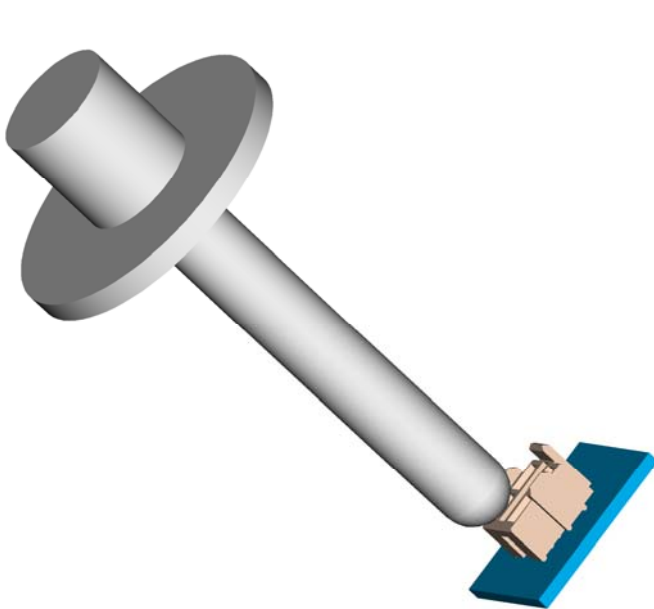
Figure 35b

Section view of Test Pin inserted  
into receptacle capture windows

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 36 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
		CLASSIFICATION <b>UNRESTRICTED</b>	

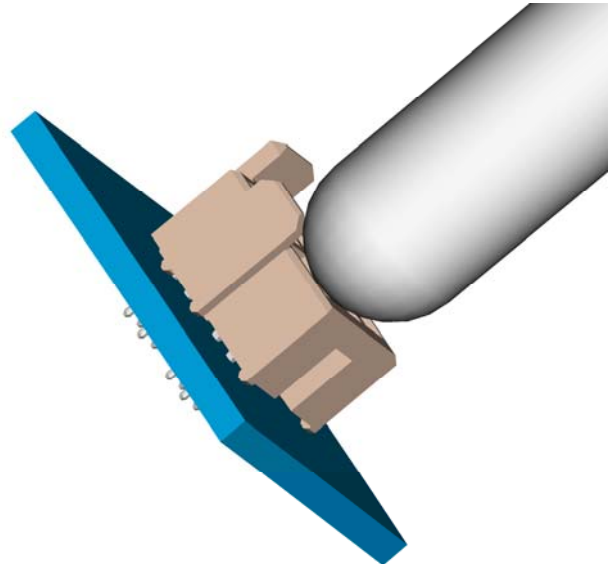
### 4.7.3. Test Probe

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 connector and will never come close to touching a powered contact within the representative receptacle.




**Figure 36a**

**3D image of Test Pin  
relative to a representative receptacle**



**Figure 36b**

**Partial view of Test Pin inserted  
into receptacle capture windows**

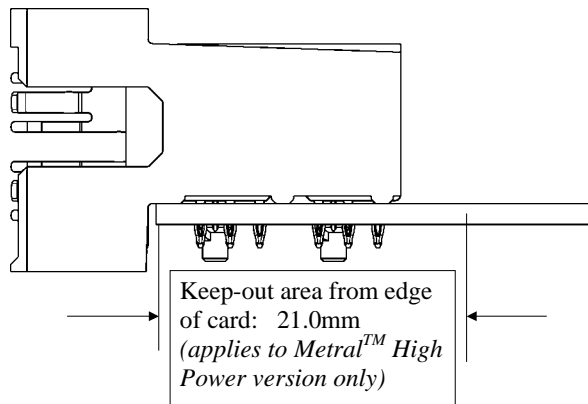
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 37 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 5. REQUIREMENTS FOR CUSTOMER PCB LAYOUT

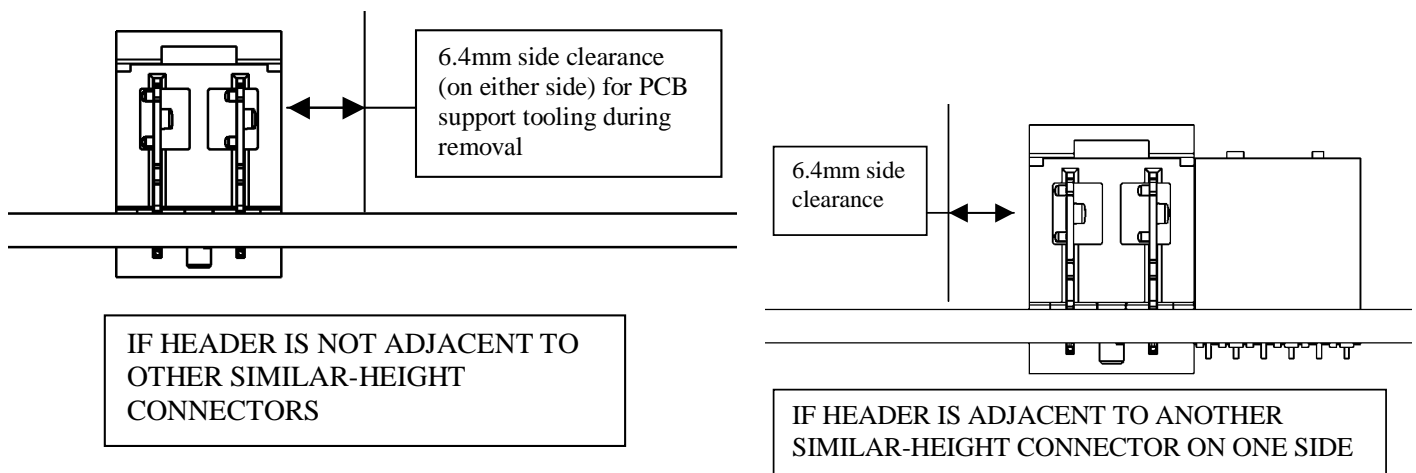
**Note:** *Generic figures are representative of all product configurations*

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

To enable proper application and removal of the headers, there are recommended keep-out zones (see Figures 37a and 37b). **If the header is adjacent to two similar-height connectors, then no keep-out zone is necessary because the removal tooling can rest on the top surfaces of those connectors.** For receptacles there are no keep-out zones needed for application or removal.



**Figure 37a: Header keep-out zone for application tooling**



**Figure 37b: Header keep-out zones for removal tooling**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 38 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
		CLASSIFICATION <b>UNRESTRICTED</b>	

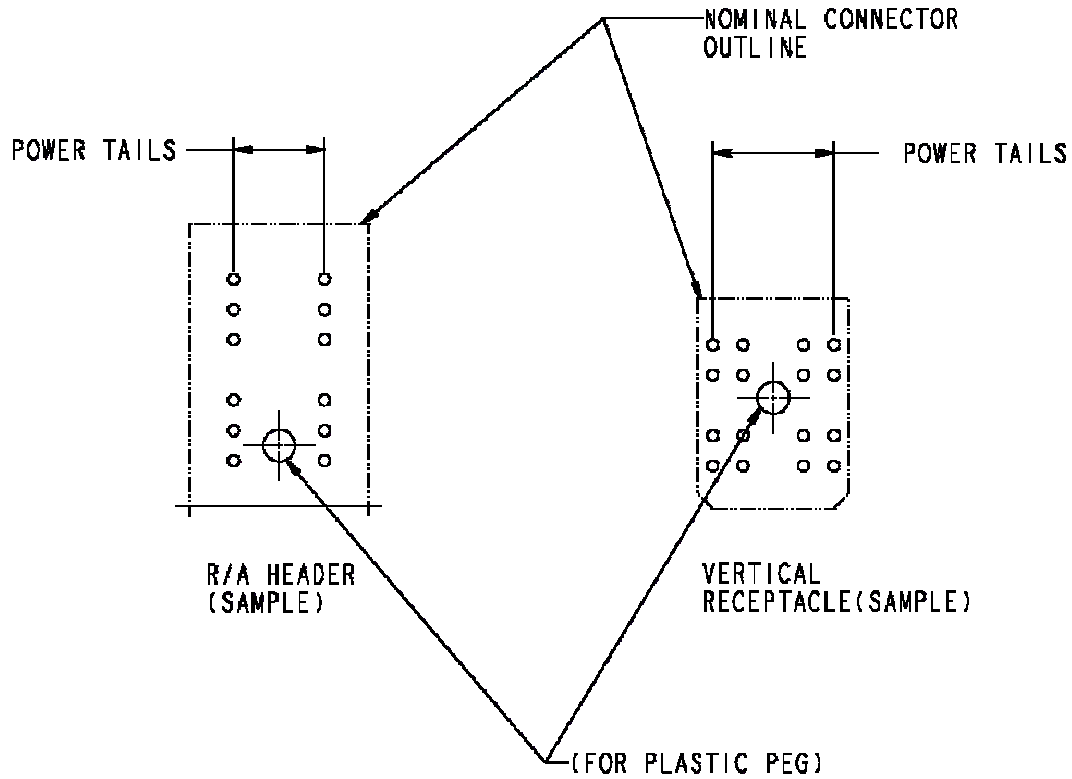


Figure 37c: PCB Layout (see customer drawings for more details)

**“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”**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 39 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 6. APPLICATION TOOLING

### 6.1. Metral™ High Power HEADERS

The application tooling kit recommended for the Metral™ High Power header (both 1x2 and 2x2 configurations) is p/n 430234-001. This kit includes a top press block and a PCB support tool.

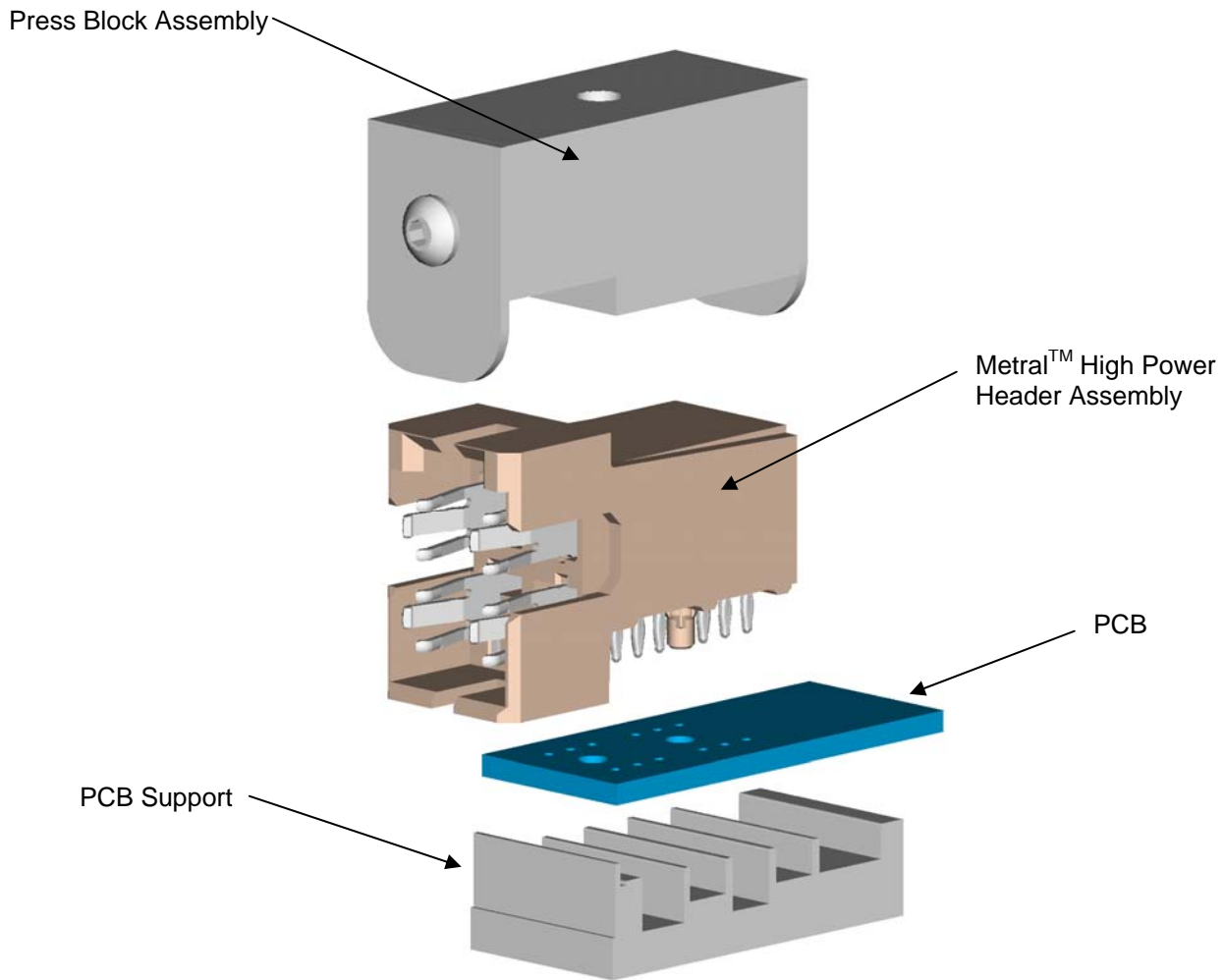


Figure 38:

1x2 and 2x2 Header Application Tooling

PDS: Rev :H

STATUS: Released

Printed: Apr 11, 2012

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 40 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 6.2. Metral™ High Power RECEPTACLES

The top press block recommended for the Metral™ High Power receptacle is p/n 430238-002. The PCB Support tool may be a board with oversize holes or custom tooling designed by the user.

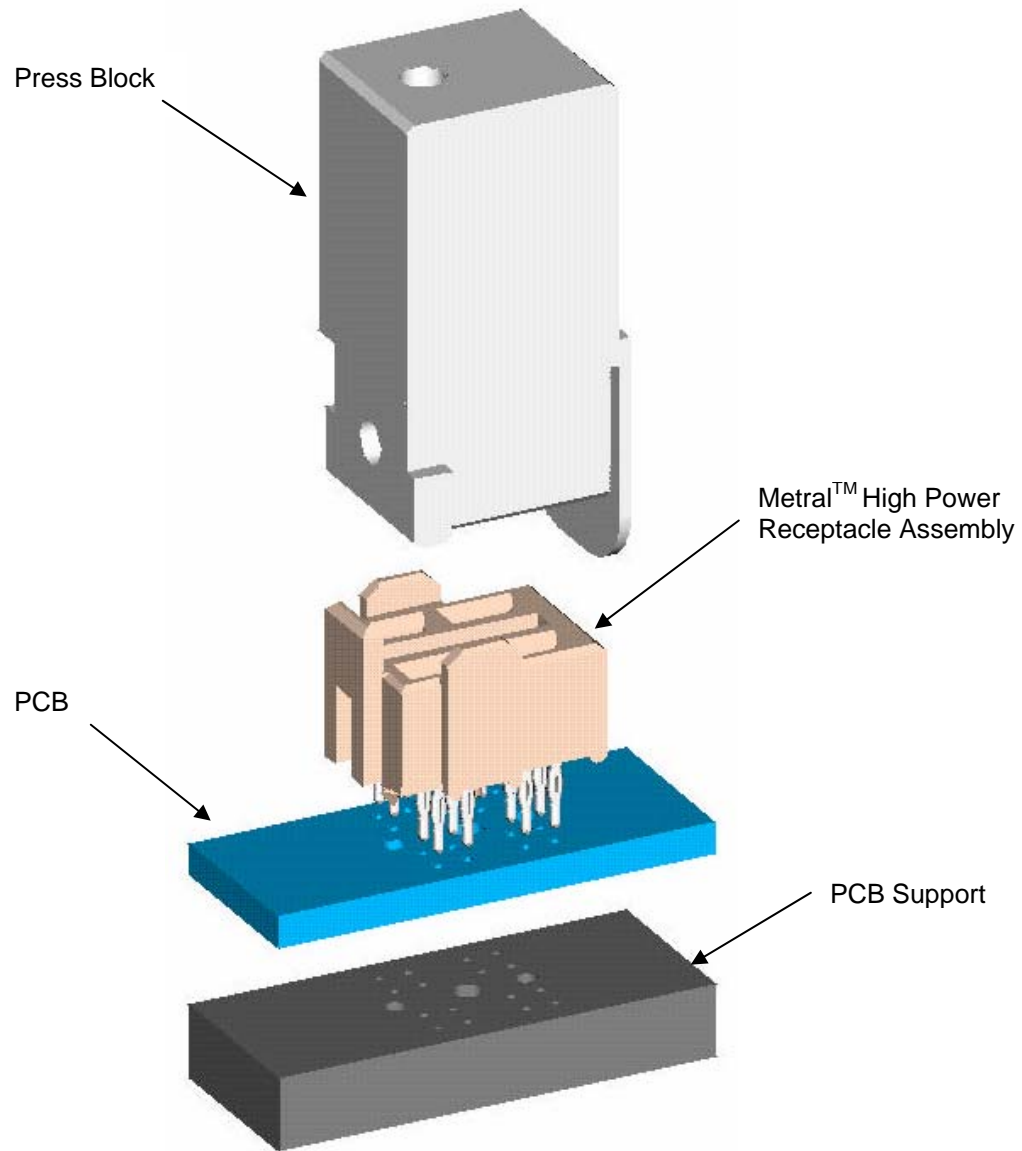



Figure 39: Receptacle Application Tooling



NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 41 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

### 6.3. AirMax™ Power HEADERS

The application press block recommended for the AirMax™ Power header (both 1x2 and 2x2 configurations) may be a flat rectangular block acting on the top surface of header housing as shown in Fig. 40. The PCB Support tool may be a board with oversize holes or custom tooling designed by the user.

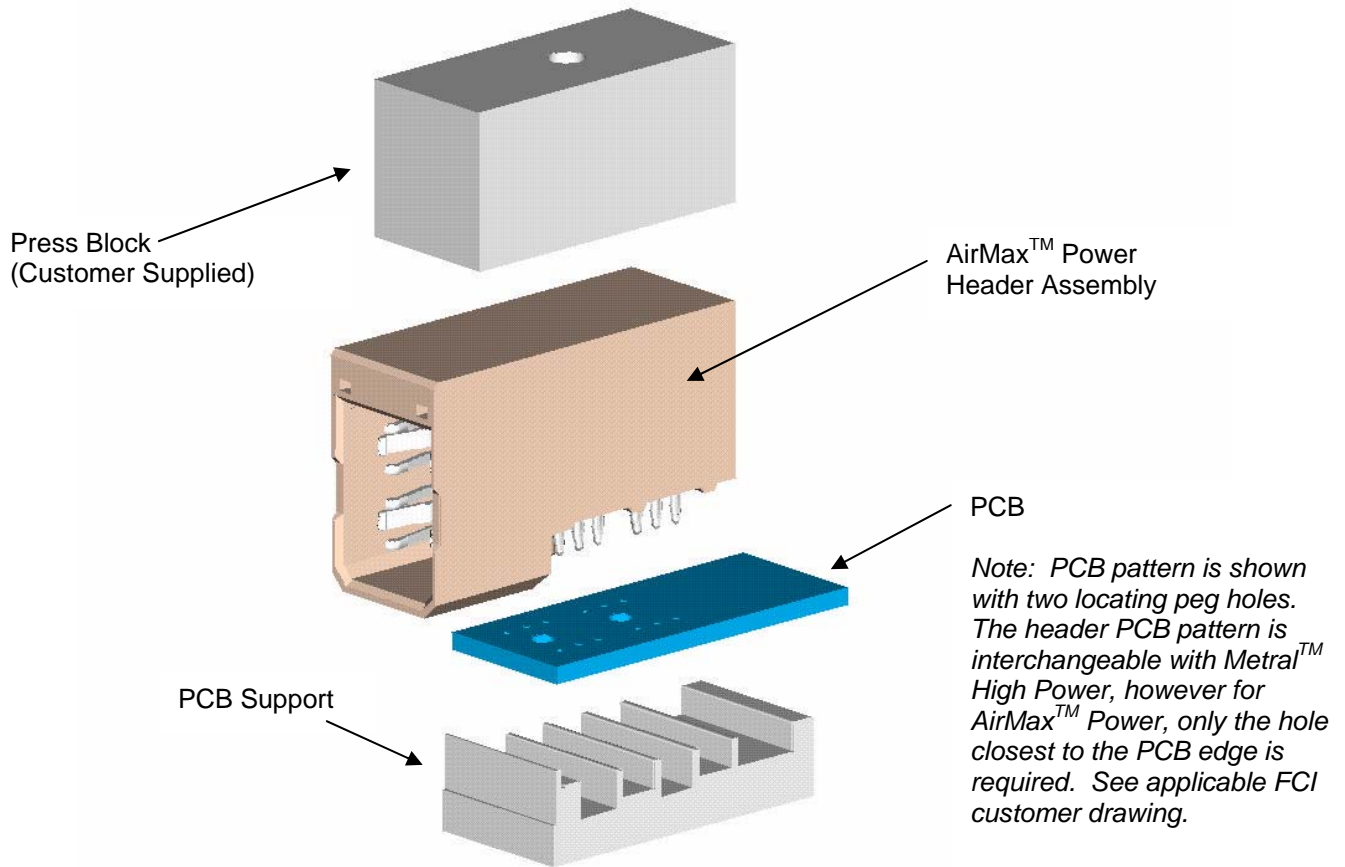


Figure 40:

Header application tooling, AirMax™ Power Version

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 42 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

#### 6.4. *AirMax™* Power RECEPTACLES

The top press block recommended for the Airmax Power Vertical Receptacle may be a flat rectangular block acting on the top surface of receptacle housing as shown in Fig. 41 The PCB Support tool may be a board with oversize holes or custom tooling designed by the user.

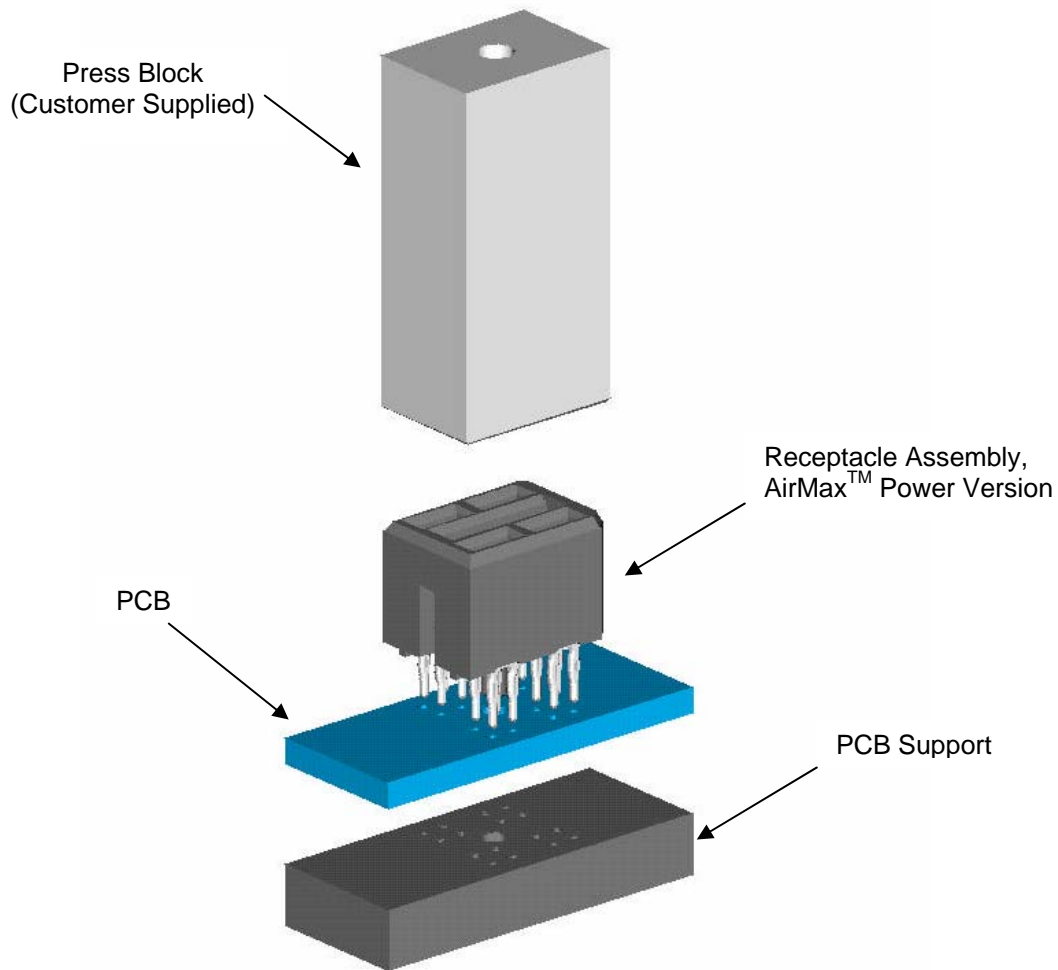
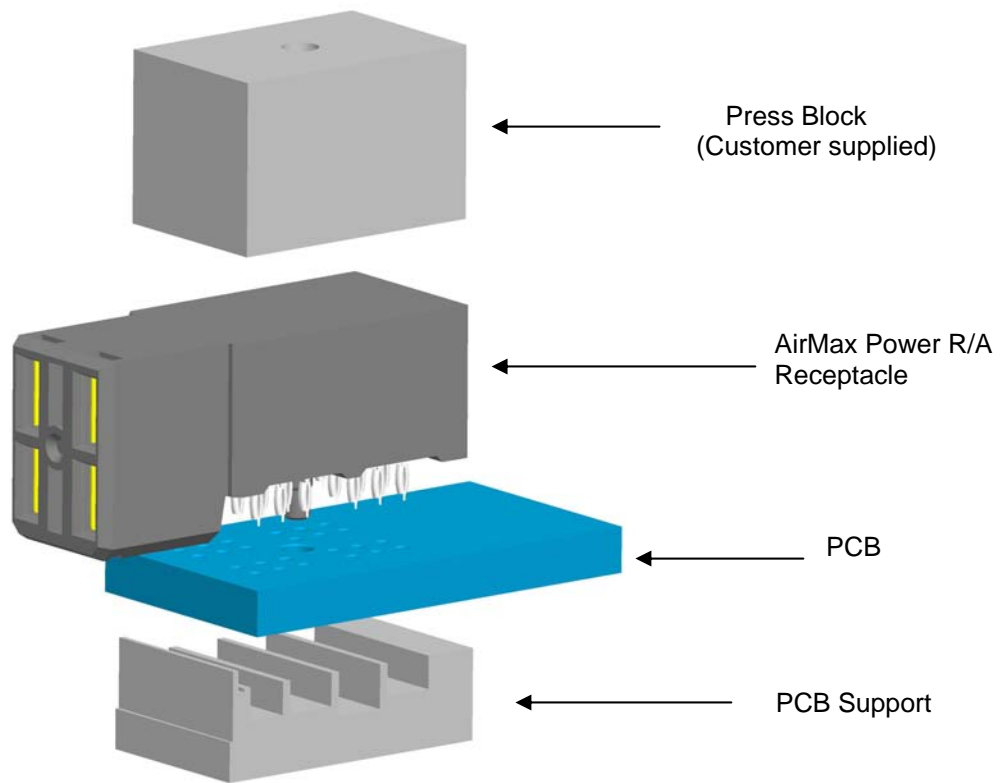


Figure 41:


Vertical Receptacle Application Tooling, AirMax™ Power Version

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION	<b>FCI</b>	
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 43 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

The top press block recommended for the Airmax Power Right-Angle Receptacle may be a flat rectangular block acting on the top surface of receptacle housing as shown in Fig. 42. The PCB Support tool may be a board with oversize holes or custom tooling designed by the user.



**Figure 42: R/A Receptacle Application Tooling, AirMax™ Power Version**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 44 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 6.5. ***CUSTOM TOOLING***

Custom application tooling can be provided by FCI for pressing mixed products simultaneously.

## 6.6. ***INSERTION PRESSES***

### 6.6.1. **Considerations when specifying a press**

The specified application tooling can work in a variety of presses. Several important items to consider when selecting an insertion press include:

- The press must have sufficient force capabilities to insert the specific receptacle configuration.
- The press ram should be sufficiently long to cover the Press Block tooling. This will prevent tooling flex.
- The press table should be large enough to properly accommodate the PCB size.


Typical press types include:

- Manual arbor press
- Pneumatic press
- Hydraulic press
- Servo driven electronic press (IMPRESS)

The recommended press type is the servo driven electronic press. This press gives the best control during the insertion process and offers the most flexibility. FCI offers arbor, pneumatic and electronic presses. For more information, contact your local Customer Service Representative.

Typical frame types include:

- “C” frame: a frame design where the press ram and press table are connected by a structural member at the rear of the press table
- “H” frame: a frame design where the press ram and press table are connected by a structural members at both sides of the press table

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 45 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			


### 6.6.2. FCI Insertion press specifications

FCI provides a range of state-of-the-art press-fit insertion machines. The IMPRESS family includes the following types:

- **IMPRESS 2000:** modular based fully automated pick-and-place insertion machine
- **IMPRESS 1000:** semi-automatic step-and-repeat press with motor driven XY-table
- **IMPRESS 500E:** hand operated servo driven C-frame press
- **Baby IMPRESS:** flat bed servo motor driven bench press
- **IMPRESS 500M+:** hand operated C-frame bench press
- **CIP-12K:** flat bed servo motor driven H-frame press

Refer to the following table for press specifications for the above mentioned press types:

SPECIFICATION	IMPRESS MODEL NO.					CIP-12K
	2000 XL	1000 XXL	500E	Baby IMPRESS	500M+	
<b>Catalog No.</b>	PAH13302	PAH156	PAY284A2	PAY326	PAY479	430000-001
<b>Press force</b>	40 kN	80 kN	80 kN	20 - 50 kN	15 kN	53kN
<b>Max board size</b>	950 x 635 mm	1200 x 625 mm	720 x 580 mm	600 mm between posts of the H-bridge	270 mm throat depth	457mm x 914mm
<b>Max tool size</b>	160 mm	255 mm	255 mm	255 mm	150 mm	457mm
<b>Press cycles per hour</b>	900	700 - 900	600	500	300	360
<b>Tool exchange</b>	Automatic	Manual or Automatic (option)	Manual	Manual	Manual	Manual
<b>Board stuffing</b>	Automatic pick-and-place	Manual	Manual	Manual	Manual	Manual
<b>Board positioning</b>	Automatic	Automatic	Manual (LMT-system optional)	Manual	Manual	Manual
<b>Board support</b>	Rising post	Rising post	Rising post	Flat bed	Fixed anvil or Flat bed	Flat bed
<b>Force controlled press stroke</b>	Provided	Provided	Provided	Provided	Not provided	Provided

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 46 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

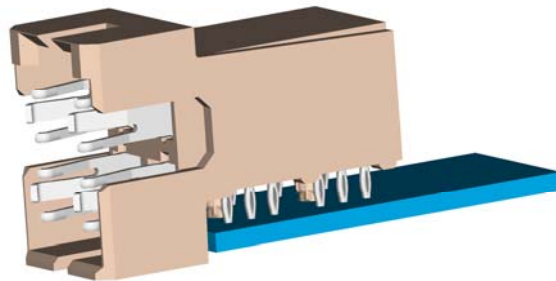
## 7. APPLICATION PROCEDURE

### 7.1. HEADERS

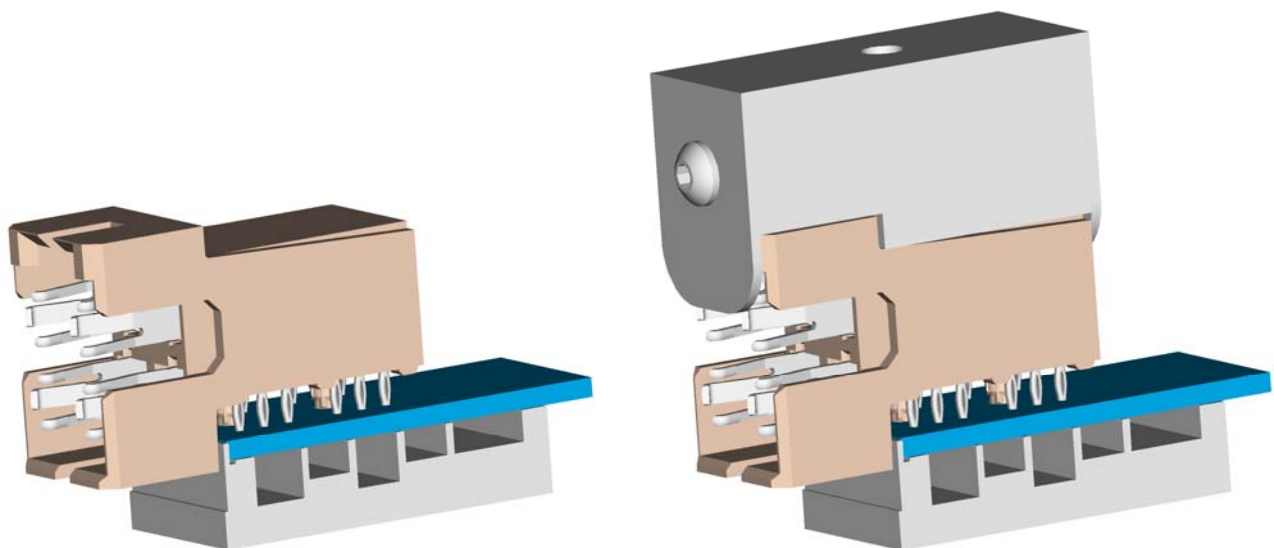
**Note: Generic figures are representative of all product configurations**

The application procedure for 1x2 and 2x2 headers is as follows:

- Place header in the desired location on the PCB taking care to assure that all press-fit tails line up with the proper holes.



- Place the Press Block Assembly and PCB Support in the proper location with respect to the header and PCB as shown below.



- To ensure proper insertion, connectors must be centered beneath the press ram. Offset loading may result in misalignment of the header and mating pins.

PDS: Rev :H


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Form E-3334  
Rev F

Form E-3334  
Rev F

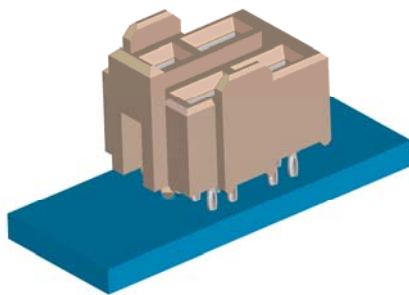
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 47 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 7.2. RECEPTACLES

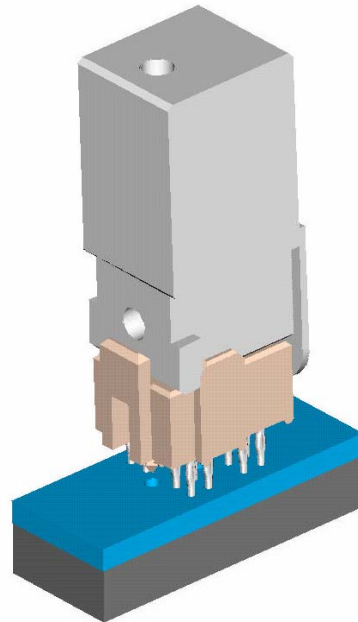
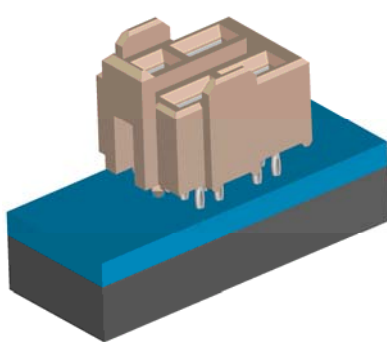
**Note: Generic figures are representative of all product configurations**

The application procedure for 2x2 receptacles is as follows:


- Place receptacle in the desired location on the PCB taking care to assure that all press-fit tails line up with the proper holes. Also be sure to properly align the location pegs with the board holes as the connectors are polarized to the PCB by these two features.



- Place the Press Block and PCB Support in the proper location with respect to the receptacle and PCB as shown below.



- To ensure proper insertion, connectors must be centered beneath the press ram.** Offset loading may result in improper seating of the header and mating problems.

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 48 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

### 7.3. RECOMMENDED INSERTION FORCES

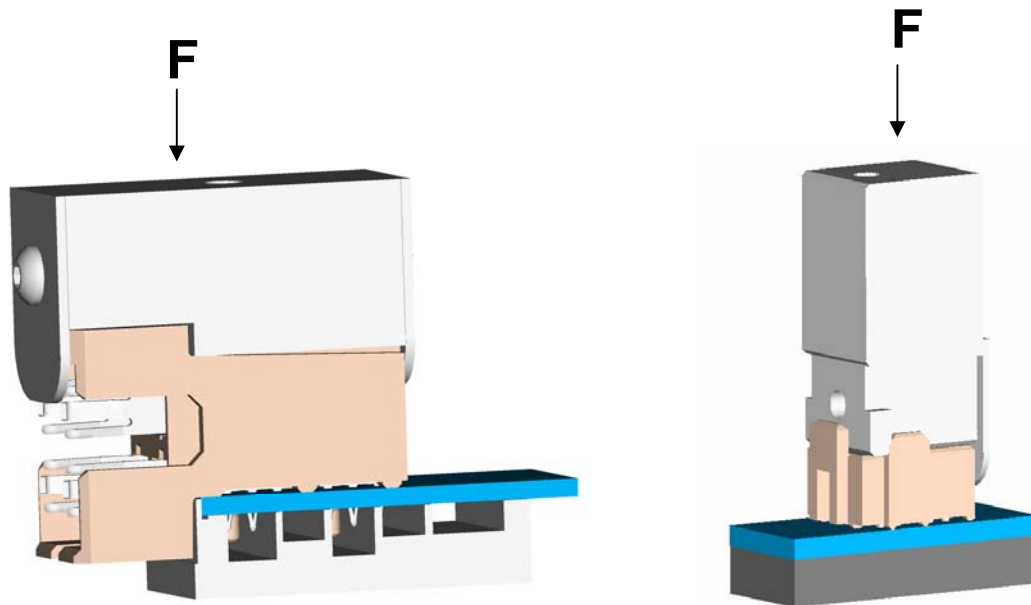
**Note: Generic figures are representative of all product configurations**

The recommended maximum insertion force for each press-fit pin is 67 N (15 lbf). The recommended maximum insertion forces for plastic press pegs is 445 N (100 lbf).


All 2mm High Power connectors utilize the same press-fit tail geometry. The recommended maximum force per press-fit has been determined to yield acceptable insertion results for SnPb PTHs. While it is acceptable to use a lower force per press-fit pin, steps should be taken to assure that the connector is fully seated (see Section 8). Force settings may vary with different types of PTH finishes. Customers should develop parameters that best suit individual application requirements.

**EXAMPLE:** For one Metral™ High Power receptacle module, there are 16 press-fit tails and one plastic press peg being inserted into the PC board. Therefore, the maximum recommended press setting would be 1517 N (16 press-fit tails x 67 N + 1 plastic press peg x 445 N).

Actuation of the insertion press should be slow and controlled, not fast like a punch press. Inserting to a specified force will yield more consistent results than inserting to a set distance. After actuation of the insertion press, and removal of the applied product, inspect product for proper application as outlined in section 8, Post Application Inspection Requirements.





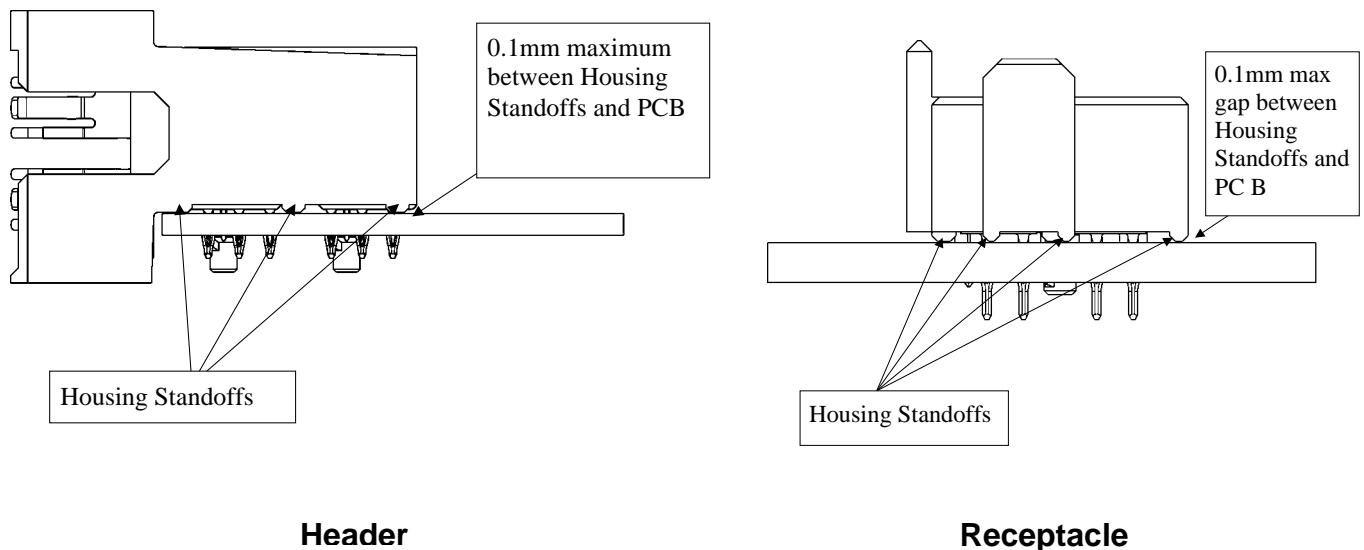
NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 49 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 8. POST-APPLICATION INSPECTION REQUIREMENTS

**Note:** *Generic figures are representative of all product configurations*


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

- Visually assure that all press-fit 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 43). 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 43:**

**Proper seating depth**

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 50 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

## 9. REMOVAL TOOLING

The FCI Manual specified for each of the following tooling options describes the proper removal procedure.

### 9.1. *1x2 HEADER, Metral™ High Power*


Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit, for protruding pins	430239-003	430259-001	Configuration in which the press-fit tails protrude at least 1.02 mm (0.040 in) below the board.
2	Removal tool kit, universal	430239-001	430259-001	Configuration that is independent of the press-fit tail protrusion below the board.

### 9.2. *2x2 HEADER, Metral™ High Power*

Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit, for protruding pins	430239-003	430259-001	Configuration in which the press-fit tails protrude at least 1.02 mm (0.040 in) below the board.
2	Removal tool kit, universal	430239-002	430259-001	Configuration that is independent of the press-fit tail protrusion below the board.

### 9.3. *RECEPTACLE, Metral™ High Power*

Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit, for protruding pins	430245-001	430260-001	Configuration in which the press-fit tails protrude at least 1.02 mm (0.040 in) below the board
2	Removal tool kit, universal	430245-002	430260-001	Configuration that is independent of the press-fit tail protrusion below the board.

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 51 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

#### 9.4. 1x2 HEADER, AirMax™ Power


Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit	430304-001	430259-001	Board thickness < 2mm
2	Removal tool kit	430305-001	430259-001	Board thickness > 2mm

#### 9.5. 2x2 HEADER, AirMax™ Power

Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit	430304-001	430259-001	Board thickness < 2mm
2	Removal tool kit	430305-001	430259-001	Board thickness > 2mm

#### 9.6. VERTICAL RECEPTACLE, AirMax™ Power

Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit	430246-001	430260-001	Board thickness < 2mm
2	Removal tool kit	430303-001	430260-001	Board thickness > 2mm

NUMBER GS-20-023	TYPE APPLICATION SPECIFICATION		
TITLE 2mm High Power Press-fit Headers and Receptacles		PAGE 52 of 51	REVISION H
		AUTHORIZED BY Ngwe Lin Soe	DATE 04 Apr 12
CLASSIFICATION <b>UNRESTRICTED</b>			

### 9.7. R/A RECEPTACLE, AirMax™ Power

Option No.	Tool Description	FCI P/N	FCI Manual	Application
1	Removal tool kit	430387-001	430387-001	Configuration that is independent of the press-fit tail protrusion below the board.

## 10. REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
A	all	Initial release	V21610	10/08/02
B	all	Updated receptacle tool p/n & figure; corrected wording in paragraph 8	V02-0226	19 Mar 03
C	All	Addition of AirMax™ Power Details	V03-1206	10 Nov 03
D	6	Added paragraph 4.2.3 regarding lead-free processing compatibility	V05-0203	24 Feb 05
E	7	Added current rating/de-rating curves	V05-0660	12 July 05
F	10	Added Airmax R/A Receptacle Power: Figure 1, Figure 8 & Table 1. Section 4.5.1 & 4.5.2: Added current rating & de-rating curves for Coplanar option.	S05-0282	03 Oct 05
G	7 & 8	Added section 4.4 Contact wipe distances & Figure 9.	S10-0169	25 Nov 10
H	9 & 38	Update Table & Added power and signal trace instruction within connector outline on PCB layout.	ELX-S-11206	04 Apr 12