



NUMBER GS-20-0365	TYPE SET-UP APPLICATION SPECIFICATION		
TITLE InfinX™ BGA Connectors		PAGE 1 of 8	REVISION A
		AUTHORIZED BY Sky Chen	DATE 2013-07-23
		CLASSIFICATION UNRESTRICTED	

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1.0 OBJECTIVE

The objective of this specification is to provide information on product features and recommended customer application of the InfinX™ High Speed Mezzanine BGA (Ball Grid Array) connector system. This specification is intended to provide general guidance for process development. It is recognized that no single process will work under all customer applications and that customers will develop processes to meet their needs. However, if these processes differ greatly from the following recommendations, FCI cannot guarantee acceptable results.

2.0 SCOPE

This specification provides information and requirements regarding application of InfinX™ BGA connectors to printed circuit boards (PCB).

3.0 APPLICABLE DOCUMENTS

- Applicable FCI product customer drawings
- FCI Product Specification GS-12-1061 (InfinX™ BGA Connectors)
- FCI packaging Specification GS-14-2234.


FCI product drawings and specifications are available by accessing the FCI website or by contacting FCI Technical Service. Customers should refer to the latest revision level of FCI product drawings for appropriate product details.

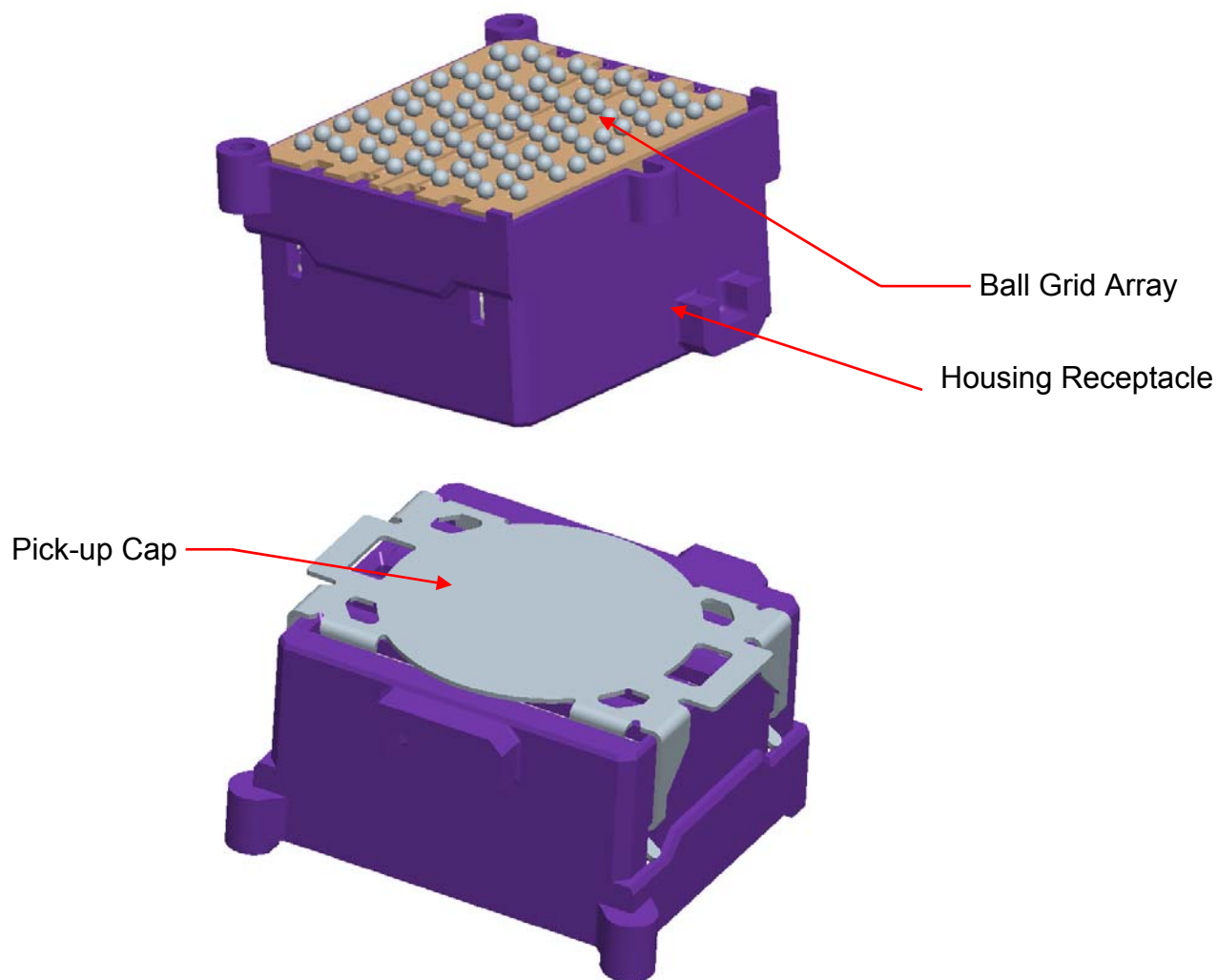
4.0 GENERAL INFORMATION

This document is a general application guide. In the event of a conflict between this specification and the product drawings, the drawings take precedence.


4.1 Product Description and Features

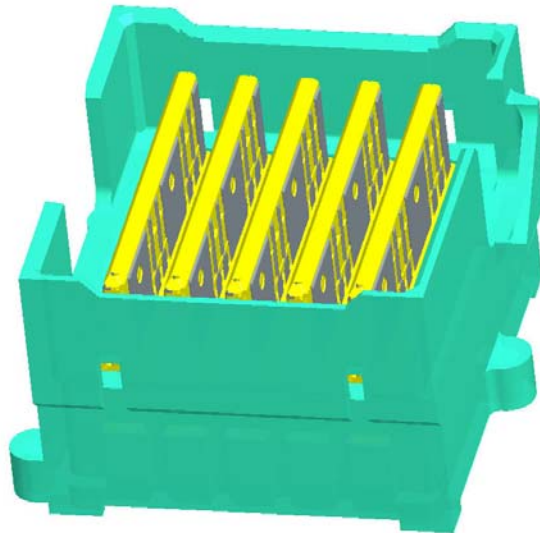
InfinX™ is a high speed, high density mezzanine connector designed to provide high speed differential and single ended electrical connection between two parallel boards. InfinX™ is a receptacle-plug connector system, mating a plug and a receptacle for a connected pair. InfinX™ utilizes Ball Grid Array (BGA) for solder attachment to the PCB (refer to Figure 1 for further details) and is provided with a processing cap for vacuum pick-up and automated surface mount placement. The product is keyed by multiple features to assure proper mating orientation.

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**Figure 1 Receptacle Connector Components & Features
(4 pair, 5 column, 9 mm high configuration shown)**

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**Figure 1 Plug Connector Components & Features
(4 pair, 5 column, 9 mm high configuration shown, Vacuum Cap Removed)**

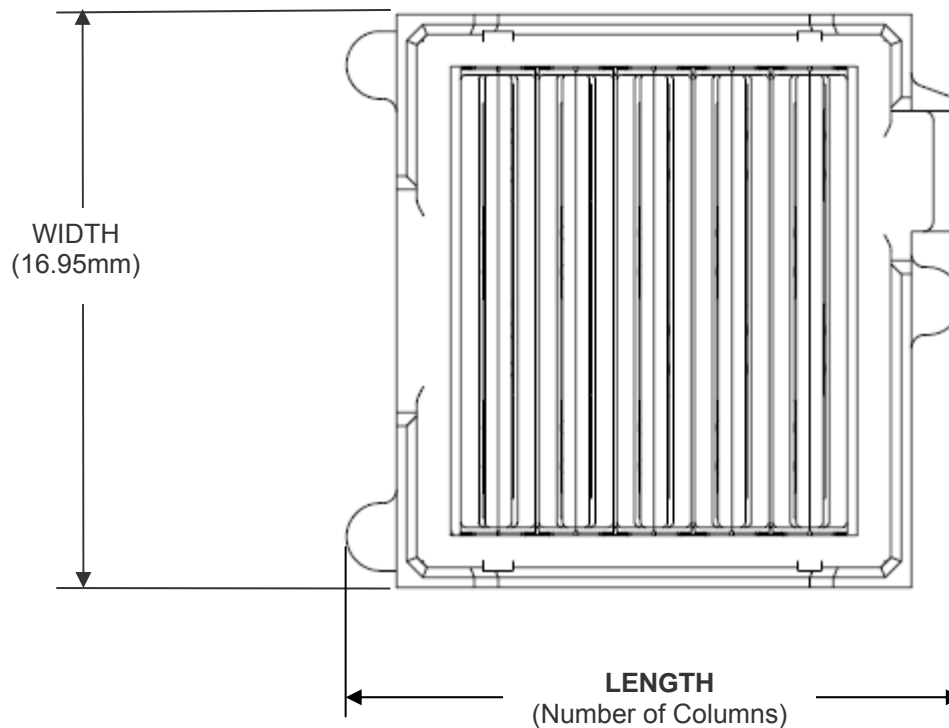



Figure 2 Overall Connector Dimensions

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5.0 Product Information

5.1 Product Configurations

InfinX™ is available in multiple stack height configurations. The available mated board to board stack height configurations are 15mm and 35mm. The connector is produced in a width of 4 differential signal pairs per column which provides 14 contacts per column. The available lengths are 5, 9, and 15 columns. At a length of 15 columns per connector it can provide a total of 210 contact positions.

5.2 Product Size

The dimensions and equations given below are for informational purposes only, please refer to the customer specific drawings for complete details.

5.2.1 Length

5.2.1.1 Plug Length

$$\text{Length (mm)} = (\text{Number of Columns} \times 2.3) + 6.65$$

5.2.1.2 Receptacle Length

$$\text{Length (mm)} = (\text{Number of Columns} \times 2.3) + 4.65$$

5.2.2 Height

The heights available are 11.1mm and 15.6mm for the plug and 9mm and 24.5mm for the receptacle.

The mating height in millimeters equals (plug height) + (receptacle height) – 5.1
Available mating heights are 15mm and 35mm

5.3 Wiping Distance

The InfinX™ contact system is designed to have 2.00 mm of nominal wiping distance. With tolerances at their absolute extremes, the minimum worst case wiping distance between the contact points is 1.65 mm.

6.0 PCB Information

InfinX IMLAs are on a 2.3mm pitch. Surface pads are 0.686mm apart.

It is recommended to screen print the connector outline onto the PCB. Refer to the specific customer product drawing for the outlining details. It is also recommended to print the row 1 polarization feature onto the PCB. This will help ensure that the connector is oriented properly on the board. As shown in figure 1, connector housings have a Δ at the row 1 position that serves as the polarization feature.


6.1 Minimum Spacing

Minimum spacing, specific pad/trace, and trace/trace between all features should be 0.1016mm to allow for manufacturing tolerances.

6.2 Drill Hole and Copper thickness

9.8mil: ISO 0.25mm

11.8mil: ISO 0.30mm

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PCB Material Thickness, mm	Copper Weight Ounces	Process	Min. Pad Size, 0.000 A/R, mm	Min. Pad Size, 0.001 A/R, mm	Min. Pad Size, 0.002 A/R, mm
0.89 to 10.16	0.5	Inner Layer	0.561	0.536	0.663
		Outer Layer	0.536	0.663	0.714
0.89 to 10.16	1.0	Inner Layer	0.587	0.637	0.688
		Outer Layer	0.637	0.688	0.739
0.89 to 10.16	2.0	Inner Layer	0.637	0.688	0.739
		Outer Layer	0.688	0.739	0.790

Table 1: InfinX Drill Minimum Pad Size vs. Copper Weight and Annular Ring ("A/R")

Notes for Table 1:

1. Outer layer pad sizes reflect panel plating process.
2. Use inner layer pad sizes for outers when pattern plating.

7.0 APPLICATION TOOLING

Connector placement and assembly to PCB does not require any special tooling. However, depending upon customer's process, in-house application specific tooling may be required.

8.0 APPLICATION PROCEDURE

8.1 Solder Paste Deposition


- No clean solder paste is recommended for ease of use.
- Recommended stencil thickness: 0.127 – 0.152 mm
- Recommended stencil aperture shape: round
- Recommended aperture diameter: 0.45 mm (for 0.152 mm thick stencil) or 0.50 mm (for 0.127 mm thick stencil). These combinations give paste volume of approximately 0.025 mm³.

8.2 Connector Placement

- Connectors are packaged and shipped in anti-static JEDEC style plastic trays. Trays have visual indicators and keying features to assure that the connectors are always oriented the same way. For additional packaging information, see FCI packaging specification GS-14-2234.
- Trays can be used individually or stacked. Prior to stacking, shipping covers shall be removed.
- Connectors are marked on the housing with a "row 1" position indicator for proper placement. Refer to the specific customer drawing for details concerning the locating feature.
- A pick-up cap, attached to the housing, is used for vacuum pick-up and placement with automated equipment. Placement by hand or with mechanical grippers that grip the outside of the connector housing or straddle the pick-up cap will also work.
- Connector shall be placed so that solder balls are placed on top of, or lightly pushed into the solder paste. Care should be taken to make sure that the connector is not dragged across the solder paste, as this will track solder paste and may cause an electrical short.

8.3 Solder Reflow

Follow the Heat profile provided by the solder paste manufacturer. Below is an example heat profile. This may differ from the profile recommended by the solder paste manufacturer. The customer must verify connector applicability for reflow through process verification testing.

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8.3.1 Lead Free

- Temperatures shall be measured on the board surface, within or near the ball grid array.
- Soak time between 175°C and 217°C should be between 75 to 100 seconds.
- Time above 217°C should typically be between 60 to 90 seconds.
- Peak temperature should be between 230 and 260°C.
- The maximum total cumulative time to ramp up, soak, and reflow shall be limited to 360 seconds.
- Nitrogen, equal to or less than 4,000 ppm O₂ can improve solderability, but is not required.
- Maximum ramp rate should be < 2.5°C per second.
- See figure 7 for an example of a lead free profile.

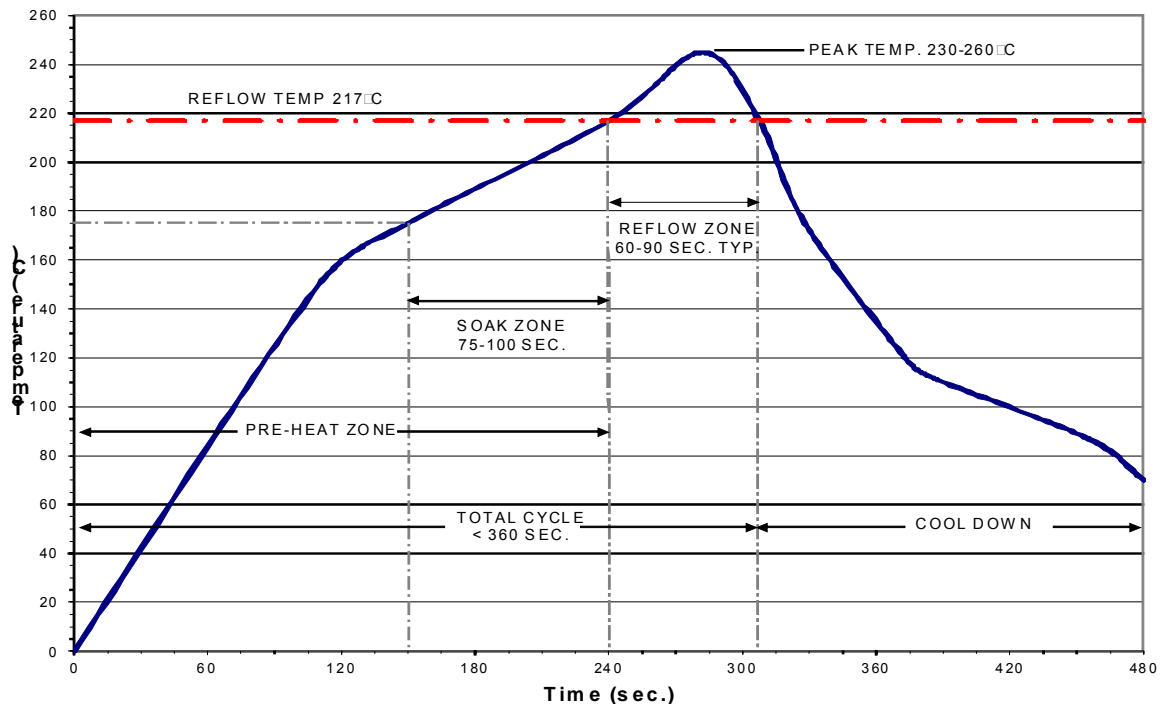


Figure 7 Lead Free Reflow Profile


8.4 Two Pass Reflow

Connector weight, reflow profile, board thickness, board size, and the number of board layers will all affect the connector's ability to be soldered in an inverted state. The customer must verify connector applicability for inverted reflow through process verification testing.

8.5 Cleaning

If desired, the connector and board assembly can be washed with an appropriate cleaner to remove any residue or contaminants after reflow.

9.0 POST APPLICATION INSPECTION

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- Visually inspect the connector for damage and cleanliness.
- Visual solder joint inspection of ball grid array components is not feasible.
- Solder joints can be inspected with X-ray techniques. A solder pad shape different than the ball section may assist in viewing the solder plane.
- Electrical testing can be performed with a customer designed system. Caution must be taken to avoid damage to the connector terminals during electrical testing.

10.0 RECORD RETENTION

REV	PAGE	DESCRIPTION	EC #	DATE
A	All	Initial release	N/A	2013-07-23