

# **Chip Carrier Package As An Alternative for Known Good Die**

By

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## **Abstract**

In the past, many companies had spent a great amount of effort to develop a method and processes for KGD. However, due to various reasons such as high cost, technical difficulties in testing through the bond pads of devices with fine pitch bond pads which are typical to those sub-0.25 um silicon technology, and availability of Chip Scale Packaging technology as an alternated solution, KGD market and activities have been reduced significantly in recent years. As a result, most KGD vendors had stopped engaging in the KGD business. However, there are still many companies, mainly in Hi-Rel field, that needs KGD for their MCM or module systems due to space and weight limitation, and they are working around the technical challenges.

Actel has been actively working an alternative for KGD for the Antifuse FPGA products for Actel's Hi-Rel customers. Actel have developed the Chip Carrier package (CC) as an alternative for KGD and is in the process of filing patent.

The Chip Carrier package is designed with the following features (Please refer to figures 1 and 2 for the details of one CC256 configuration):

- a. The bottom of the package is in Land Grid Array format, and it can be in 1.27, 1.0, 0.8, 0.75, 0.5mm or other pitches.
- b. The size of the Chip Carrier package is silicon die size dependent. The bigger die size needs a bigger size Chip Carrier Package.
- c. It has external bonding posts on top edges of the package. This is to route out signals to customer system boards or MCMs.
- d. Electrical testing and programming are through the bottom of the package via land grid array pads.
- e. The assembly of die can be in traditional wire bond or Flip Chip format.
- f. It can be hermetically sealed to meet 5000 ppm maximum moisture level.

## **The status of Chip Carrier Package qualification and significance of its configuration:**

The Chip Carrier Package has been fully qualified to Military temperature grade and shipped to customers. Actel is in the process of doing Mil-883B flow qualification for the package. Actel's customers can now obtain a full electrical test and limited environmental tests data in a very small footprint Chip Carrier 256 package. More importantly, Actel's Antifuse products can be programmed in this Chip Carrier package reliably and verified the functionality before putting into customers' final system board. This offering significantly reduces the cost and risks of using a un-fully tested bare die into the boards.

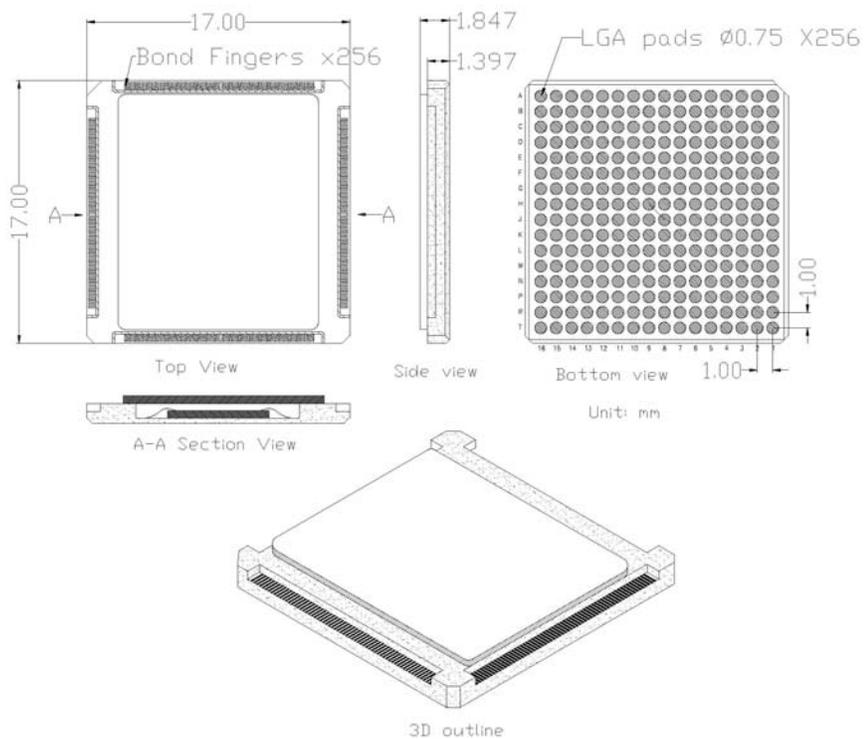
**Figure 1**  
Chip Carrier(CC256) package top and bottom view



Enlarge pictures



**Figure 2**  
CC256 Outline drawing(drawings are not in scale)



**Keywords:** KGD: Known Good Die

Bonding posts: a leadfinger on edge of Chip Carrier package intended for wire bonding to route out signal from package to board system.

Hi-Rel: High Reliability.