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一种提高芯片与基板对准精度的方法

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摘 要：设计一套吹气装置，并分别采用相位相关法和二元二次曲面拟合亚像素法计算未启用吹气装置和启用吹气装置后图像间的平移，采用梯度函数对图像清晰度进行评价。研究结果表明：未启用吹气装置时，图像抖动与模糊现象严重；随着温度升高，图像间的平移与平移标准差增大，在键合温度为160 ℃左右时，最大抖动可达7~8个像素，达不到对准精度的要求；启用吹气装置后，图像间整像素级的抖动明显消除，在键合温度下最大抖动量不超过0.3个像素，能满足对准精度要求；启用吹气装置后，图像梯度明显增大，消除了图像模糊现象。

关键字：热超声倒装键合；图像抖动；相关函数；亚像素；曲面拟合；梯度函数

A method for improving alignment precision of chip and substrate

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Abstract:A set of pneumatic device was designed. The phase correlation algorithm was adopted to compute the translation between images which were captured without the pneumatic device and the sub-pixel method based on binary-quadratic curved surface fitting was adopted to compute the translation between images which were captured with the pneumatic device. Gradient function was adopted to evaluate image definition. The results show that without the pneumatic device, the phenomenon of image dithering and blurring is intense. The translation and its standard deviation increase with the increase of temperature. The dithering can reach 7-8 pixels at the working temperature, which can not meet the requirement of precision alignment. With the pneumatic device, the integral pixel image dithering disappears. The maximal dithering is less than 0.3 pixel at the working temperature, which can meet the requirement of precision alignment. The gradient function value of these images becomes bigger and the image blurring is eliminated after using the pneumatic device.

Key words:thermosonic flip-chip bonding; image dithering; correlation function; sub-pixel; curved surface fitting; gradient function

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