THE EFFECT OF PACKAGE CAVITY ON THE WIREBOND HIGH FREQUENCY PERFORMANCE

Xiang-Yin Zeng[1], Mostafa Abdulla[2] and Qing-Lun Chen[2]

[1]Intel China LTD
2299 Yanan Road (west), Shanghai Mart Tower
Shanghai, China 200336
xiang.yin.zeng@intel.com

[2]Intel Corporation,
9750 Goethe Road, LOC4/19
Sacramento, CA 95827, USA
mostafa.abdulla@intel.com

ABSTRACT

Nowadays, package-interconnects is performance–limiting components in RF, and high-speed applications. The high frequency discontinuity introduced by wirebond inductance could affect the high frequency circuit performance significantly. However, wirebond technology is still attractive due to its reliability and cost effectiveness.

To reduce the wire bond inductance, wire length is minimized as possible. Recently, UltraBGA package technology was introduced to minimize bond wire length and therefore increase the package bandwidth. This is achieved by putting the bare die inside a grove (cavity), which formed inside the metallic package ground (Fig 1.).

Since package substrate thickness is less than the bare die thickness and the die is inside a metallic cavity, a high frequency effect is expected. Changing the ground height will affect bond wire characteristic impedance and cause high frequency discontinuity and limit the package bandwidth. So far, no work reports the effect of the change of ground plan height on the wirebond performance and bandwidth.

In this presentation, the impact of package cavity on the package bandwidth will be discussed. The insertion and return losses of different wire bond schemes and package configurations are evaluated using finite element method and de-embedding techniques. An optimized layout and design recommendations will be presented. This technique will help wirebond packages to achieve wider bandwidth to accommodate high-speed applications.

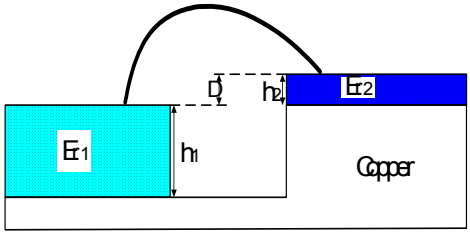

Fig.1 Wire bond interconnect structure