Mitigation of Chip Proximity Effect Using Air Cavity in Flip-Chip Interconnect

Rhonda Franklin Drayton (PI) , Young Seek Cho
Electrical and Computer Engineering, University of Minnesota

● DESCRIPTION OF WORK

◆ The goal of the work is to investigate the chip proximity effect and mitigate it to design wide band flip-chip interconnect with low profile solder bump pad.
◆ The conventional flip-chip interconnect with air cavity were characterized by simulation and measurements.
◆ Design guidelines for the air cavity were developed.

● MAJOR OBSERVATIONS

◆ The depth of the air cavity should be 2 times bigger than the gap (G) of signal line and ground plane of coplanar waveguide.
◆ The bandwidth of return loss below 20 dB is achieved up to 15 GHz using the air cavity on the motherboard.

Fig. 1. Conventional flip-chip interconnect with an air cavity

Fig. 2. Comparison of S-parameters between conventional flip-chip interconnect and conventional one with air cavity

0 1 02 03 04 05 0
-60 -50 -40 -30 -20 -10 0

S11(dB)

CFC Interconnect, W=70, G=47, Measured
CFC Interconnect, W=70, G=47, Simulated
CFC with Air Cavity, W=70, G=47, Measured
CFC with Air Cavity, W=70, G=47, Simulated

0 10 20 30 40 50
0 -3 -6 -9 -12

S11(dB)

Frequency(GHz)