Investigation of the bonding process of anisotropic conductive films joints

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The use of anisotropically conductive film (ACF) for the direct interconnection of flipped silicon chips to printed circuits (flip chip packaging), offers numerous advantages such as reduced thickness, improved environmental compatibility, lowered assembly process temperature, increased metallization options, cut downed cost, and decreased equipment needs. The most common chip-on-glass (COG) interconnections technology currently used in display applications is based on anisotropic conductive film (ACF). The principle of COG bonding using ACF is that the electrical connections are established through conductive particles and the mechanical interconnections are maintained by the cured adhesive. The size of the contact area and the shape of the fillers are important factors in determining conductivity.

In this study, the bonding process of COG (Chip-on-Glass) assemblies are investigated by finite element analysis and experiments. The results show that the effects of bonding parameters (bonding temperature, bonding pressure and bonding time), properties of the substrate, ACF materials and the conductive particles on the reliability are significant. Additionally, the artificial neural network (ANN) is powerful in handling dispersed data, and moreover it can also adjust the state of the network on the base of the original network in order to adapt to new data-sets through training with these new data-sets. In this paper, an ANN is used in predicting the reliability of the COG assembly under different processes.

Key words: anisotropic conductive film (ACF); bonding process;artificial neural network; electronic packaging; reliability of ACA joints