



CTE Mismatch Large CBGA Versus FR4

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It is not recommended to mount large size CBGA (over 25mm square) onto FR4 because there are large differences in the $18\text{ppm}/^{\circ}\text{C}$ CTE of the FR4 material versus the $6.7\text{ppm}/^{\circ}\text{C}$ CTE of Ceramic substrates.

Large size CBGA625 (32.5mm SQ) can definitely be soldered to high temperature FR4 boards, but when the assembly is subjected to repetitive temperature cycling (-55°C to $+125^{\circ}\text{C}$) after 100 to 300 of cycles, the balls on the CBGA will begin to peel off the board.

There is no benefit to switch to low temperature Sn62/Pb36/Ag2.0 balls, because the composition of solder ball will **NOT** improve the CTE mismatch of FR4 versus ceramic.

Even if you switch from Sn10/Pb90 and use Sn62/Pb36/Ag2.0 or SnAgCu, large CBGA ($>32.5\text{mm Sq}$) will exhibit failure after repetitive temperature cycling.

To prove out the CTE mismatch phenomena, it is an interesting exercise to mount smaller CBGA along with larger CBGA onto high T_g FR4 material.