

BT versus FR4 BGA Components

BT substrates are used in the mainstream IC world to minimize TCE (thermal coefficient of Expansion) mismatch between the silicon die and the BGA substrate. During temperature cycling, TCE mismatch (between the substrate and the die) induces stress on the bonding wires that cause fatigue and eventual failure.

FR4 is more affordable and more readily available than BT. Since TopLine's dummy LBGA and eBGA series do use wire bonding, there is no concern that TCE mismatch will cause the bonding wires to fatigue.

The LBGA and eBGA series should be for limited applications such as for making temperature profiling of the solder balls. TopLine does not recommend that the LBGA and eBGA series be used for making temperature life studies.

Approximate TCE of Various Materials

BT = 12.4ppm/Deg C

Silicon = 2.8ppm/Deg C

FR4 = 17ppm/Deg C

PI = 12~16ppm/Deg C

SnAgCu Solder ball 17.6 ppm/°C

SnPb Solder ball 25 ppm/ °C