Abana Technology, Inc.

HTCC/ LTCC Introduction:

High purity ceramics used in the industrial world are also called “fine ceramics.” Among fine ceramics, LTCC & HTCC are classified as electronic ceramics with are used as electronic materials.

Normal electronics ceramics are fired at a temperature of at least 1500°C. The circuit electrodes are made of a fire-resistant metal (e.g. tungsten or molybdenum) because they are fired at high temperature.

Along with the use of increasingly high frequency electrical signals, characteristics issues such as the delay in signal propagation due to the high electrical resistance of these metals became noticeable. Which led to the development of ceramic circuit boards which used metals with low electrical resistance.

LTCC ceramics are made by mixing a glass component with an alumina ceramic, enabling the firing temperature to be reduced to no more than about 600-900°C. This in turn enables metals with low electrical resistance such as silver or copper to be used for the wiring of the internal layers.

LTCC & HTCC are suitable for multi-layering of circuits by means of simultaneous firing of the ceramic and the internal layer conductors. Permits miniaturization of circuit modules.
Ceramics usually retains its physical dimensions in the x and y direction. Restricts its shrinkage to only the z-direction (thickness).

Characteristics of LTCC:
-Excellent HF properties provided by low dielectric losses and high conductivity metal
-High electrical conductivity of metal patterns
-Realization of hermetic packages by fluxes soldering processes
-Embedded passive components (resistors, inductors, capacitors) provide space saving solutions
-Variety of product options are available based on different tape and metal paste systems
Low temperature co-firing technology presents advantages compared to other packaging technologies including high temperature co-firing: the ceramic is generally fired below 1,000°C due to a special composition of the material. This permits the co-firing with highly conductive materials (silver, copper and gold). LTCC also features the ability to embed passive elements, such as resistors, capacitors and inductors into the ceramic package minimizing the size of the complete module.

Abana Technology, Inc.

Characteristics of HTCC:
-Excellent mechanical stability
-Easy integration into metal housings due to matched thermal coefficient of expansion
-High thermal conductivity
-Use of non-noble metal pastes
-Additional plating reveals solderable and wire bondable surfaces

HTCC packages generally consist of multilayers of alumina oxide with tungsten and molymanganese metallization. The advantages of HTCC includes mechanical rigidity and hermeticity, both of which are important in high-reliability and environmentally stressful applications. Another advantage is HTCC's thermal dissipation capability, which makes this a microprocessor packaging choice, especially for higher performance processors.