

## CERAMIC SUBSTRATES

NEO Tech is North America's leading manufacturer of high-reliability LTCC and HTCC substrates and packages. Low Temperature and High Temperature Co-fired Ceramic technology presents a unique solution for high density interconnects, compact networks and high frequency applications. We also offer standard Thick Film Substrates for signal and low power applications, using a variety of materials such as BeO, AlN and Alumina (Al<sub>2</sub>O<sub>3</sub>). For microwave and space applications we have developed a proprietary Thick Film process we call ECP, offering the high-resolution lines of Thin Film with the cost advantages of Thick Film.

# CERAMIC SUBSTRATES

## Ceramic Substrate Capabilities

- Thick Film
- BeO Substrates
- Plating
- Etch-back

## Ceramic Substrate Manufacturing Overview

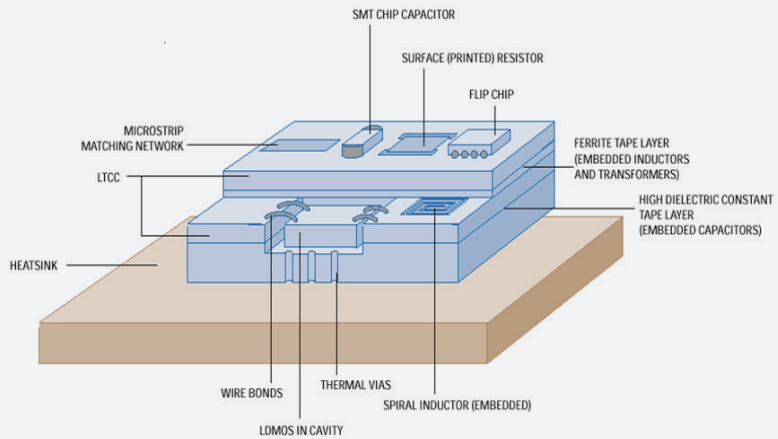
- In-house fabrication of ceramic boards offers tight process controls
- Hermetic Properties
- Capability for 50+ layers
- Improved thermal performance over plastics

## What is LTCC

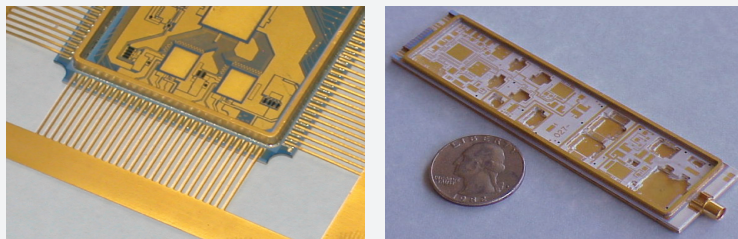
- Low Temperature Co-Fired Ceramic (LTCC)
- Multi-layer ceramic PCB specially for high frequency applications because it uses gold and silver conductors

## Advantages of LTCC

- Smart Substrates
- Packaging
- Structural functions
- Any combination



Examples of LTCC



## ECP Thick Film Systems

NEO Tech provides next generation Etch Conductor Photolithography (ECP) Thick Film Substrates suitable for microwave and high-resolution lines and spaces applications. The Thick Film conductor material is fired in a dense, non-porous film over a large area of the substrate. The high resolution lines are then defined using photoresist and etch techniques to achieve widths and spaces as low as 0.003" (0.0762mm). The ECP process is based around standard thick film Au that is already qualified by many OEMs, thus avoiding long qualification cycles and bringing to market quickly. ECP technology allows designers to combine RF and digital functions on substrates, and offers options for integrating capacitors, resistors, inductors, couplers, and filters.

## Material Systems

### LTCC SYSTEMS

- Base Material: Alumina (Al<sub>2</sub>O<sub>3</sub>)
- DuPont 951, 9K7, and 943 tape systems
- Ferro A6M, A6S, and L8 tape systems
- Gold, silver and mixed metal systems
- Ni-Au plated silver metallization available

### HTCC SYSTEMS

- Base Material: Aluminum Nitride (AlN)
- Thermal Conductivity >150 W/mK,
- Tungsten metallization electroless plated with Ni-Au

### THICK FILM SYSTEMS

- DuPont, Ferro, ESL, and Heraeus Gold, Silver, and Copper Conductors
- Compatible with Al<sub>2</sub>O<sub>3</sub>, AlN, and BeO
- Etched conductors [0.001" (0.0254 mm)] lines/ spaces
- Precision layer to layer dielectric alignment (+/- 12.5 micron) in multilayer construction
- Dense, sold thru-holes [0.007" (0.178 mm diameter)] for interconnection/grounding
- On-circuit integration of passive components including Lange couplers, resistors (0.5 Ohm - 100 m Ohm, trimmed to 1%) and capacitors (5 - 200pF, trimmed to 3%), inductors, couplers, and filters