

# Technical Data Sheet

## Ceramic Powders and Formulations for Passive Components Low Temperature Ceramic Formulations

### Application

Ferro's LCF mid-K and high-K ceramic formulations are designed for passive electronic component applications that include ESD/EMI filters, MLCC and single layer chip components.

LCF Series formulations are co-fireable with 100%Ag, 95 Ag/5Pd, and 90Ag/10Pd conductors.

Ferro's LCF Ceramics are Pb/Cd free and are formulated and processed to be RoHS compliant.

**Storage and Shelf-life:** These products should be stored in tightly sealed containers at 10 - 25°C, in a dry place away from direct sunlight. Shelf life of a factory sealed container is minimum 2 years from date of shipment when properly stored.

### Typical Processing Recommendations

#### Slurry Process:

- Powder size and surface area are designed for typical tape casting process.
- Dispersion: Ball mill 1/2" ZrO<sub>2</sub> Media
- First Stage Milling: Formulation Powder & Solvent
- Second Stage Milling: PVB-type Binder Solution

**Lamination:** 3000 psi at 70°C with a 10 minute dwell time; no pressure followed by a lamination time of 10 minutes.

**Firing:** Forced air/exhausted belt or box furnace.

- 2°C/min from 25°C to 450°C
- 2 Hr. soak @ 450°C
- 6-8°C/min from 450°C to peak temperature
- See table below for specific peak temperatures and soak times

Product Code		LCF40	LCF75	LCF90	LCF1000
Dielectric Constant <sup>1</sup>	@ 1 MHz	40	75	90	1100 <sup>3</sup>
Q-value	@ 1 MHz	> 4000	> 2500	> 2000	n/a
Particle Size	D50    μm	0.95	0.85	0.70	0.70
Surface Area	m <sup>2</sup> /g	4.3	6.5	7.1	4.2
Powder Density <sup>2</sup>	g/cc	4.8	5.5	5.9	5.7
Loss-on-Ignition (LOI)	wt-%	< 1.3	< 1.3	< 1.3	< 1.5
Peak Firing Temperature	°C	830 - 870	860 - 900	940 - 980	850 - 900
Time at Peak Temperature	minutes	30	30	60	30

<sup>1</sup>Bulk Ceramic

<sup>2</sup>Helium Pycnometer.

<sup>3</sup> Measured at 1KHz



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