



# PRELIMINARY TECHNICAL DATA SHEET

**MRA Laboratories, Inc.**

Materials, Research & Applications

MRA Product No. HF-402

## Product Description

HF-402 is an environmentally friendly, high fire X7R dielectric available from MRA Laboratories, Inc. This material is RoHS compliant (not formulated with lead or cadmium). HF-402 features a dielectric constant of  $4000 \pm 300$ . It is compatible with up to 70 Pd/30 Ag electrode systems.

## Key Features

- RoHS compliant
- Low dissipation factor and very stable X7R TCC
- Excellent high voltage performance for a high dielectric constant material
- Consistent lot to lot uniformity

## Typical Powder Properties

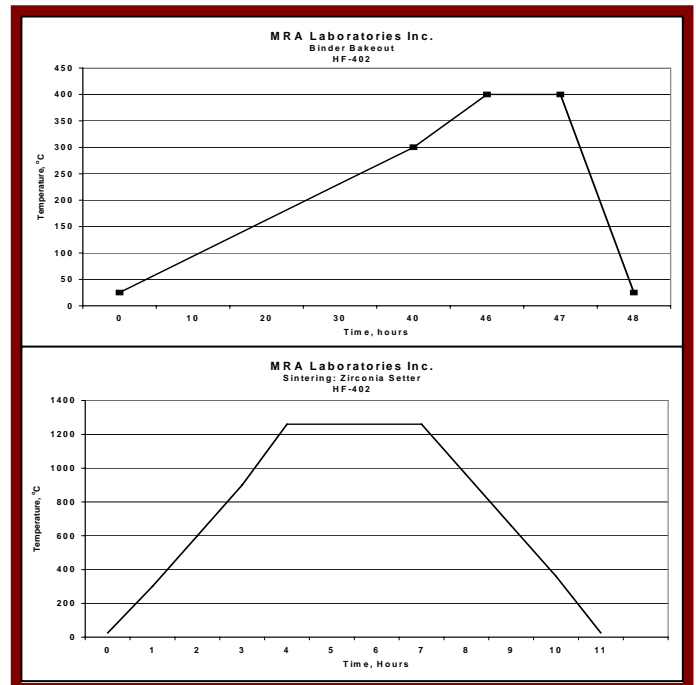
Tap Density  $2.5 \pm 0.5$  gm/cc  
 Powder Density  $\geq 5.9$  gm/cc  
 Surface Area  $2.5 \pm 0.5$  M<sup>2</sup>/gm  
 Particle Size, microns  
     D<sub>90</sub>  $\leq 1.9$   
     D<sub>50</sub>  $0.65 \pm 0.10$   
     D<sub>10</sub>  $0.40 \pm 0.10$   
 LOI (650°C, 6 hours)  $\leq 0.3\%$

## Sintering Conditions

Binder burnout to 400°C  
 Sintering 1250°C ( $\pm 10^\circ\text{C}$ )/3 hours (Zr setter)  
 Fired density (ceramic)  $\geq 5.75$  gm/cc

## Typical MLCC Characteristics

Chip Size 1206 Active Layers 22 (100% Pd)  
 Dielectric Thickness 0.75 mil  
 K  $4000 \pm 300$   
 Dissipation Factor  $< 2\%$  @ 1Vrms  
 Insulation Resistance at 150V, 125°C  $1 \times 10^{10} \Omega$   
 Dielectric Withstanding Voltage  $> 1000$  V/mil



The data presented is based on our research and is considered to be fair representation of this product. MRA makes no warranties, expressed or implied, as to its accuracy and assumes no liability out of its use by others.