



A FERRO COMPANY

# TECHNICAL DATA SHEET "K"-44 COG dielectric "VLF-440"

VLF-440 is an environmentally friendly very low fire mid K COG dielectric. This dielectric is not formulated with any bismuth, cadmium or lead compounds. VLF-440 is an excellent choice for range extension of high Q and high frequency COG products.

## Key Features

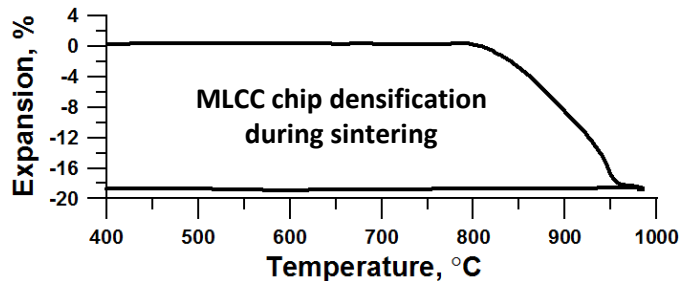
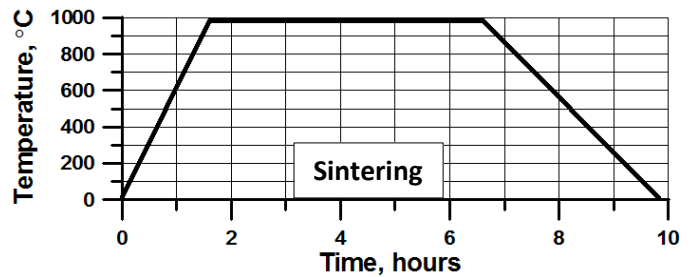
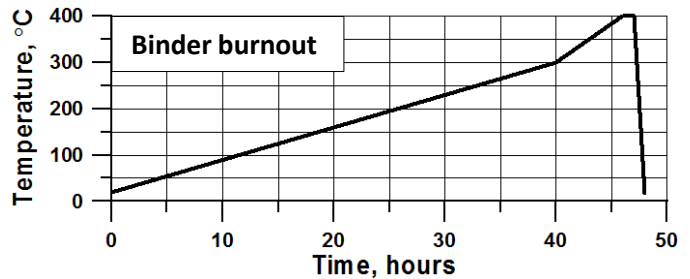
- ❖ Environmentally friendly (RoHS compliant)
- ❖ Dielectric constant of 35 to 45
- ❖ Compatible with up to 95% Ag / 5% Pd electrode systems
- ❖ Excellent lot to lot uniformity

### Typical powder properties

- Powder density, g/cm<sup>3</sup> **≥ 4.50**
- Surface area, m<sup>2</sup>/g **3.75 ± 0.75**
- Particle size, μm
  - D<sub>90</sub> **≤ 3.000**
  - D<sub>50</sub> **0.600 ± 0.150**
  - D<sub>10</sub> **0.375 ± 0.125**
- LOI (650°C, 6 hours), % **≤ 1.00**

### Sintering conditions

- Binder burnout up to 400°C in air
- Sintering 985°C ± 10°C/5 hours in air
- Heating rate 10°C/min
- Open ZrO<sub>2</sub> setter
- Fired density ≥ 4.10 g/cm<sup>3</sup>



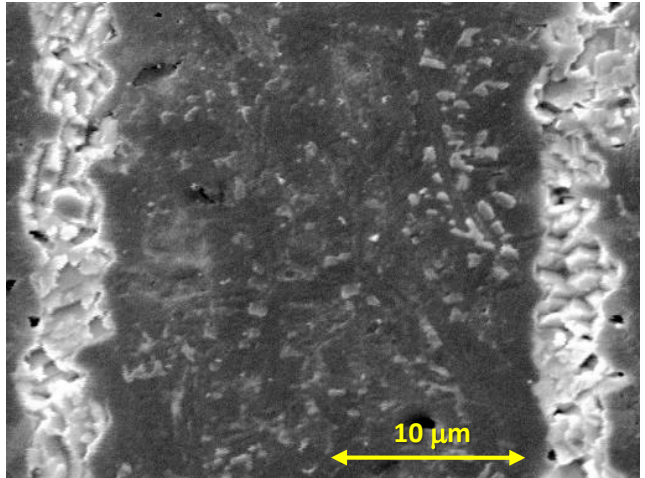
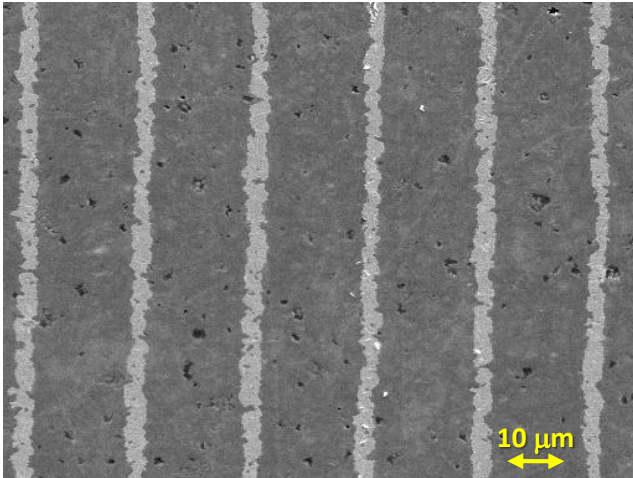
**MIRA - committed to excellence in  
multi-layer ceramic device technology.**

ISO 9001:2015

BUREAU VERITAS  
Certification



## Typical cross-sectional microstructure of sintered MLCC chip



### Mechanical properties of the dielectric

- Coefficient of thermal expansion from 200°C to 600°C,  $\mu\text{m}/\text{m}^*\text{K}$  **9.9**

### Typical MLCC characteristics

- Chip size **0805**
- Active layers **10.5**
- Electrode: **90% Ag / 10% Pd**
- Dielectric thickness,  $\mu\text{m}$  **~20**
- Dielectric constant  **$40 \pm 5$**
- Dissipation factor, %  **$\leq 0.04$  @ 1kHz, 1Vrms**  
 **$\leq 0.10$  @ 1MHz, 1Vrms**
- Insulation resistance at 300V and 125°C,  $\Omega$   **$> 10^{11}$**
- Dielectric withstanding voltage,  $\text{V}/\mu\text{m}$   **$\geq 60$**

### Temperature variation of capacitance

TCC COG ( $\pm 30\text{ppm}/^\circ\text{C}$  from  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$ )

*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.*