



A FERRO COMPANY

TECHNICAL DATA SHEET "K"-450 N2200 dielectric "LF-451C"

LF-451C is an environmentally friendly low fire N2200 dielectric formulated from high purity sub-micron zirconate-titanate compounds. This material is RoHS compliant (not formulated with lead or cadmium). It is compatible with 70% Ag / 30% Pd electrode systems and is an excellent choice for demanding MLCC applications where low loss and improved voltage response are required.

Key Features

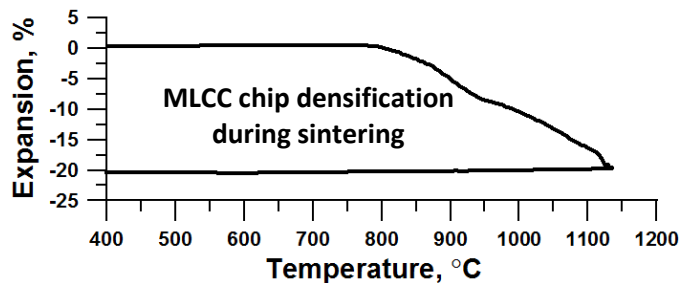
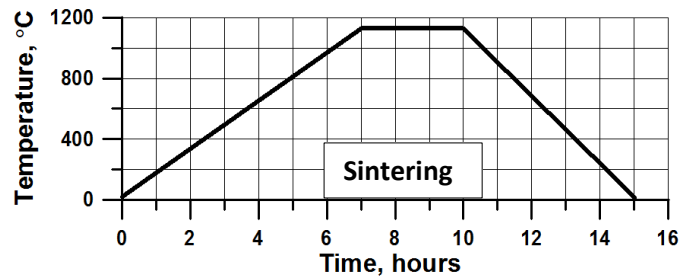
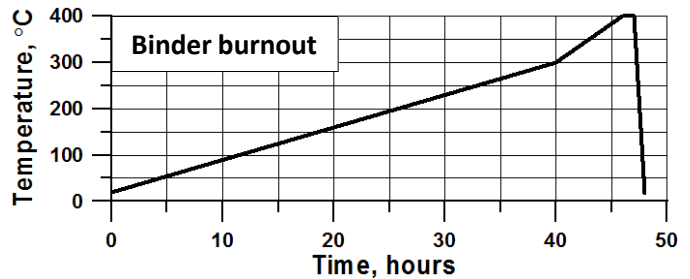
- ❖ Environmentally friendly (RoHS compliant)
- ❖ Highest dielectric constant commercially available N2200 formulation
- ❖ Compatible with up to 70% Ag / 30% Pd electrode systems
- ❖ Very low dissipation factor
- ❖ Excellent lot to lot uniformity

Typical powder properties

- Powder density, g/cm³ **≥ 5.40**
- Tap density, g/cm³ **1.70 ± 0.40**
- Surface area, m²/g **3.05 ± 0.95**
- Particle size, μm
 - D₉₀ **≤ 4.00**
 - D₅₀ **0.70 ± 0.30**
 - D₁₀ **0.40 ± 0.15**
- LOI (650°C, 6 hours), % **≤ 0.50**

Sintering conditions

- Binder burnout up to 400°C in air
- Sintering 1140°C ± 10°C/3 hours in air
- Heating rate 3°C/min
- Open ZrO₂ setter
- Fired density ≥ 5.40 g/cm³



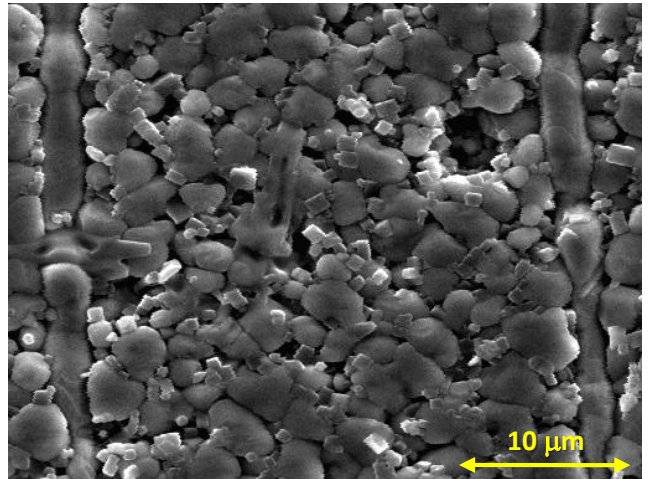
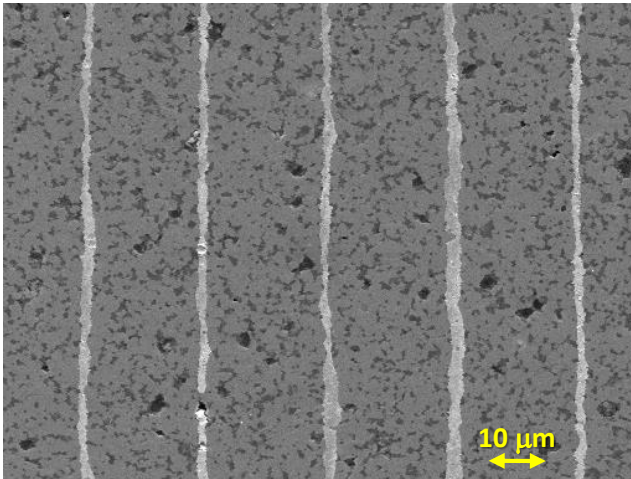
**MRA - committed to excellence in
multi-layer ceramic device technology.**

ISO 9001:2015

BUREAU VERITAS
Certification



Typical cross-sectional microstructure of sintered MLCC chip



Typical MLCC characteristics

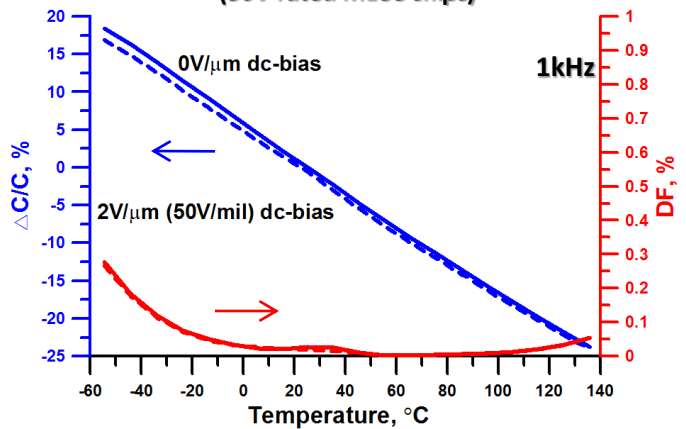
- Chip size **0805**
- Active layers **10**
- Electrode: **70% Ag / 30% Pd**
- Dielectric thickness, μm **~ 20**
- Dielectric constant **485 ± 75**
- Dissipation factor, % **≤ 0.05 @ **1kHz, 1V_{rms}****
- Insulation resistance at 300V and 125°C, Ω **$> 10^{11}$**
- Dielectric withstanding voltage, V/ μm **≥ 40**

Temperature variation of capacitance

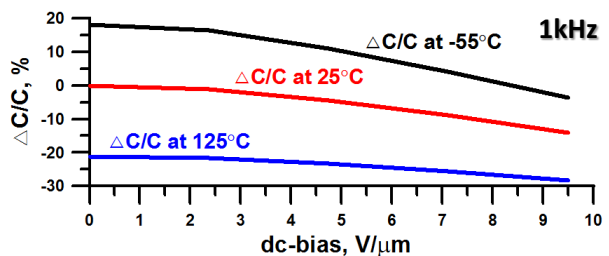
TCC N2200 ($2200 \pm 300\text{ppm}/^\circ\text{C}$ from -55°C to $+125^\circ\text{C}$)

Temperature and voltage variation of capacitance

(50V rated MLCC chips)



Voltage variation of capacitance



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.