Low Temperature Co-Fired Ceramic Systems
A6M-E High Frequency LTCC Tape System

Application
Ferro’s A6M-E LTCC Tape system combines stable dielectric constant and unique low loss over a wide frequency range making it ideal for Hi-reliability packaging applications.

A6M-E tape is an enhanced version of A6M with improved handling, lamination and green cutting properties while maintaining the same properties and performance of A6M.

A6M-E is available in standard tape thicknesses of 2, 5, and 10 mils and in roll and blank forms.

A complete set of highly engineered Gold based conductors make A6 the material system ideal for high frequency modules and components up to 110 GHz.

A6M-E and associated metallizations are formulated and processed to be RoHS and REACH compliant.

Typical Fired Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Thermal Coefficient of Expansion</td>
<td>7.0 ppm/°C</td>
</tr>
<tr>
<td>Tape Shrinkage</td>
<td>15.8 ± 0.3 % X,Y</td>
</tr>
<tr>
<td>Fired Density</td>
<td>26.0 % Z</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>170 MPa</td>
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<tr>
<td>Young’s Modulus</td>
<td>92 Gpa</td>
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<tr>
<td>Thermal Conductivity</td>
<td>2 W/mK</td>
</tr>
<tr>
<td>Dielectric Constant</td>
<td>5.7 ± 0.15 @10 GHz</td>
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<tr>
<td>Loss Tangent</td>
<td>&lt; 0.0015 @10 GHz</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 10^10 Ω</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>&gt; 750 V/mil</td>
</tr>
<tr>
<td>Electrolytic Leakage Current</td>
<td>&lt; 1 µA/cm²</td>
</tr>
</tbody>
</table>

Electrical Test Methods:
- Split-Post Resonator (1–10 GHz)
- Split-Cylinder Resonator (5–30 GHz)
- Fabry-Perot Resonator (30–100 GHz)
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Typical Process Parameters

Metallization:
- Au-based System
  - FX30-025H Au Inner Conductor
  - CN30-078PF Au Via Fill
  - CN30-080M Au Surface Wirebondable
  - CN36-020 AuPtPd Surface Solderable
- Mixed-Metal Based System
  - CN33-398 Ag Inner Conductor
  - CN33-407 Ag Via Fill
  - CN39-005 AuPtAg Transition Via Fill
  - CN30-080M Au Surface Wirebondable
  - CN36-020 AuPtPd Surface Solderable
- Ag-based System
  - CN33-398 Ag Inner Conductor
  - CN33-407 Ag Via Fill
  - CN33-391 Ag Surface Conductor
- Resistors
  - FX87 Series Resistors
- Post Fireable System
  - FX30-025JH Brazeable Au Base Layer
  - 4007 Brazeable Au Top Layer
  - CN31-014/17 Solderable AuPt Conductor
  - 3066 Wirebondable Au Conductor (Au)
  - 3068N Wirebondable Au Conductor (Al)

Lamination: Iso-static 3000 psi (21Mpa) @ 70°C for 10 minutes

Setters: Fused quartz for typical applications; Zirconia felt for hi-metallization parts

Binder Burn-out: Room temperature to 450°C at ≤ 2°C/min, with 2 hour hold at peak in box (preferred) or belt furnace with 100 scfm air-flow.

Firing: 450 to 850°C @ 6-8°C/min, with 10-15 minute hold at peak in box (preferred) or belt furnace with controlled with 100 scfm air-flow.

1 Refer to Ferro’s LTCC Design Guide for specific process parameters and specifications

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