High Speed
High Frequency

DuPont™ Pyralux® TA & HXL
flexible circuit materials

DuPont™ Pyralux® TA double side FCCL

Features
- Excellent insertion loss performance
- Excellent static bending repeatability
- Similar process capability with PI base FCCL and no additional FPC process R&D cost

Properties
- Equivalent low loss performance with LCP and much better static bending repeatability than LCP
- Ideal solution for consumer electronics high speed and high frequency applications

![Insertion Loss Comparison - 50 Ohm Lines](image)

**DuPont™ Pyralux® TA Copper Clad Laminate**

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Constant 10 GHz,</td>
<td>3.2</td>
</tr>
<tr>
<td>Loss Tangent 10 GHz</td>
<td>0.003</td>
</tr>
<tr>
<td>MIT Flex Test R=0.8mm</td>
<td>800</td>
</tr>
<tr>
<td>Flame Rating, UL</td>
<td>V-0</td>
</tr>
</tbody>
</table>

**DuPont™ Pyralux® HXL Adhesive & Coverlay**

Features
- Excellent insertion loss performance
- Excellent mechanical performance
- Similar lamination temperature as conventional epoxy adhesive and coverlay (~180°C)

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Test Conditions</th>
<th>Typical Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peel Strength [Kgf/cm]</td>
<td>AR</td>
<td>HXL0025</td>
<td>HXL0050</td>
</tr>
<tr>
<td></td>
<td>After Solder Float</td>
<td>1.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Dielectric Constant @10 GHz</td>
<td>260°C/10sec</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Dielectric Constant @10 GHz</td>
<td>2.3</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Dissipation Factor @10 GHz</td>
<td>0.0039</td>
<td>0.0037</td>
<td>0.0046</td>
</tr>
</tbody>
</table>

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DuPont™ Pyralux® AP and TK are ideal solutions to meet the needs of low signal loss, excellent controlled impedance and maximum signal quality of flex circuit interconnections.

**Features**

- Choice of multiple dielectric materials available (all-polyimide and fluoro-PI dielectric laminates)
- System offerings (e.g. flexible copper laminates and compatible bonding materials)
- Broad selection of laminate constructions (dielectric thickness available at 25µm ~ 150µm)
- Stable and Low dielectric constant value (Dk available at 2.3 ~ 3.2)
- Low insertion loss value (Df available at 0.001 ~ 0.003)
- Excellent thickness uniformity (lot-to-lot)
- Low moisture absorption
- Excellent mechanical & chemical properties

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**Features**

- **Loss tangent of various flex copper clad laminates waveguide resonator measurements**

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Df</td>
<td>0.020</td>
<td>0.015</td>
<td>0.010</td>
<td>0.005</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**Measured loss per unit length - coax versus flex - SE**

**50 Ohm line width at different dielectric constant values**
**High Speed**
**High Frequency**

DuPont™ Interra® HK04J
planar embedded capacitor

**DuPont™ Interra® HK04J enhances power/ground signal integrity for internet infrastructure and workstations**

**Features**
- Lowest insertion loss -2.5dB/10CM @10GHz (TA 2mil in micro strip design)
- Excellent static bending performance >10 cycle (TA 2mil, 360 degree, 0 radius)
- Drop in process capability

**Features**
- Stable DK, capacitance
- Hi Pot voltage of >1500V for Interra® HK04J
- Superior thickness control provides tight tolerance for coefficient of capacitance

**Benefits**
- Extremely reliable and stable
- Reduce power system impedance
- Replace surface mount capacitors and fewer PTHs
- Reduce over-all board thickness (size & weight)

Increased functionality (power) and switching speeds (voltage) in circuitry
Causing significant increase in series inductance