**Product Description**

DuPont QM44 is a filled, crystallizable screen printed thick film dielectric composition and is an integral element of the DuPont QM44 multilayer system. It is a versatile dielectric for use in both high reliability and low cost MCM (Multi-Chip Module) and hybrid interconnect applications.

**Product Benefits**

- Broad conductor compatibility (gold, silver, and mixed metal)
- Thin, 2 print, hermetic dielectric film.
- High resistance to E.M.F. (electro-motive force) blistering and shorting.
- Robust electrical and mechanical properties.
- Compatible co-fire conductors.

**Processing**

**Substrates**

Properties are based on tests on 96% alumina substrates. Substrates of other compositions and from various manufacturers may result in variations in performance properties.

**Printing**

Printing should be carried out in a clean and well ventilated area. The combined fired thickness of the dielectric should be 30 ± 2 µm. This can generally be obtained by printing the individual layers with a 230-280 mesh stainless steel screen at speeds of 6 ips.

**Drying**

Allow prints to level for 5-10 minutes at room temperature. Then dry for 10-15 minutes at 150°C.

**Typical Fired Properties**

<table>
<thead>
<tr>
<th>Test</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fired thickness (µm)</td>
<td>30 ± 2</td>
</tr>
<tr>
<td>Via Resolution (µm)</td>
<td>250-300 (diameter)</td>
</tr>
<tr>
<td>Max. no. circuit layers</td>
<td>&lt; 8</td>
</tr>
<tr>
<td>Camber*** (mil/in)</td>
<td>&lt; 2</td>
</tr>
</tbody>
</table>

**Typical Electrical Properties**

<table>
<thead>
<tr>
<th>Test</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Constant (@ 1 KHZ)</td>
<td>8 - 10</td>
</tr>
<tr>
<td>Dissipation Factor (@ 1 KHZ)</td>
<td>&lt; 0.2%</td>
</tr>
<tr>
<td>Insulation Resistance (@ 100VDC)</td>
<td>≥10¹²</td>
</tr>
<tr>
<td>Leakage Current* (µA/cm²)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Breakdown Voltage (V/30 µm)</td>
<td>&gt; 1000</td>
</tr>
<tr>
<td>EMF Blister Resistance**</td>
<td>&gt; 30 firings</td>
</tr>
</tbody>
</table>

* Standard measurements made after 5 min @ 10VDC
** Maximum no. of firings performed without blisters observed with Substrate/gold/dielectric/silver configuration
*** Measured deflection of 5” x 1” substrate with 5 circuit layers. Single-sided.

**Composition Properties**

<table>
<thead>
<tr>
<th>Test</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity (Pa.s)</td>
<td>80-120</td>
</tr>
<tr>
<td>(Brookfield HBT, UC&amp;SP, 50 rpm, 25°C)</td>
<td></td>
</tr>
<tr>
<td>Thinner</td>
<td>DuPont 4553</td>
</tr>
<tr>
<td>Coverage (cm²/g)</td>
<td>110-130</td>
</tr>
<tr>
<td>(based on a fired thickness of 14 µm)</td>
<td></td>
</tr>
</tbody>
</table>

This table shows anticipated typical physical properties for DuPont QM44 based on specific controlled experiments in our labs and are not intended to represent the product specifications, details of which are available upon request.
Fire each dielectric print separately in a well ventilated moving conveyor furnace, in air. A 30-minute cycle with a peak temperature of 850°C held for 10 minutes should be used.

Storage and Shelf Life
Containers should be stored, tightly sealed, in a clean, stable environment at room temperature (<25°C). Shelf life of material in unopened containers is six months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

System Elements

<table>
<thead>
<tr>
<th></th>
<th>Silver</th>
<th>Mixed Metal</th>
<th>Gold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Conductor</td>
<td>QM22 (3:1)</td>
<td>5771 (gold)</td>
<td>5771</td>
</tr>
<tr>
<td></td>
<td>7484 (3:1)</td>
<td>4597R (solderable)</td>
<td>4597R</td>
</tr>
<tr>
<td></td>
<td>6277 (6:1)</td>
<td>QG150 (fine line)</td>
<td>QG150</td>
</tr>
<tr>
<td></td>
<td>QM18 (100:1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>QM17 (Pt/Ag)</td>
<td>QM17</td>
<td>5771</td>
</tr>
<tr>
<td></td>
<td>QM14 (Ag)</td>
<td>QM14</td>
<td>QG150</td>
</tr>
<tr>
<td>Via Fill</td>
<td>QM34</td>
<td>QM34 (inner)</td>
<td>5747</td>
</tr>
<tr>
<td></td>
<td>QM35 (top)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistor Series</td>
<td>S1X0</td>
<td>S1X0</td>
<td>S1X0</td>
</tr>
</tbody>
</table>

* Bold/Italic type denotes that the conductor may be cofired on QM44

Dielectric
QM44 A filled, crystallizable, two print Dielectric Composition

Silver Conductors
QM22 A unique 3:1 silver/palladium, cofire or sequentially fire, not for aluminum Wirebonding.
7484 3:1 silver/palladium sequentially fire only, used when Al wire bonding is needed.
6277 6:1 silver/palladium sequentially fire only.
QM17 silver/platinum, cofire or sequentially fire internal conductor, sequentially fire top conductor for traces only.
QM18 silver/platinum, cofire or sequentially fire top conductor for traces only.
QM14 silver, cofire or sequentially fire internal conductor, sequentially fire top conductor, sequentially fire top conductor for traces only.
QM34 A unique silver via fill, cofire or sequentially fire, not for connecting silver to gold conductors.
QM35 A unique silver/platinum via fill, used as transition via for connecting silver to gold conductors, not recommended for stacked vias.

Gold Conductors
5771 A general purpose cadmium-free* gold, internal & top conductor, cofire or sequentially fire, not for large (>2 mil) aluminum wire bonding.
QG150 Cadmium-free* high density gold conductor, cofire or sequentially fire.
4597R Cadmium-free* replacement of 4596 (solderable gold), cofire or sequentially fire.
5747 Cadmium-free* replacement of 5727 (gold via fill), cofire or sequentially fire.

Resistors
S1X0 Variant of the 2000 Series Resistor Composition for QM44, 10 ohm-1Meg ohm, sequentially fire.

*Cadmium “free” as used herein means that these are not intentionally added to the referenced product. Trace amounts however may be present.
Safety and Handling
For Safety and Handling information pertaining to this product, read the Material Safety Data Sheet (MSDS).

For more information on DuPont QM44 or other DuPont Microcircuit Materials products, please contact your local representative:

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