

# DuPont Microcircuit Materials

## APPLICATION PROFILE

### Innovative Thick Film Packaging Solution for Next-Generation Hearing Aid

#### Challenge

##### Customized Packaging for Miniature Components

Sound Design Technologies, based in Burlington, Ontario, Canada, is a world leader in designing integrated circuits and providing advanced miniaturized packaging solutions for the hearing instrument market.

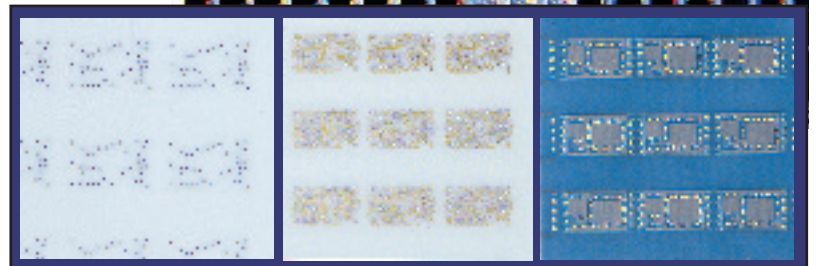
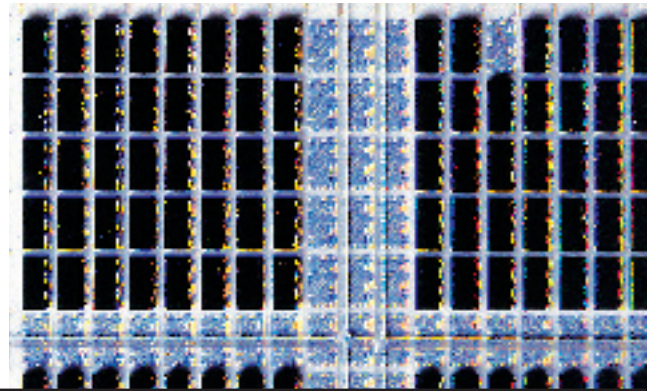
When one of Sound Design's customers asked the company to provide a customized packaging solution for an advanced digital hearing aid module, Sound Design's engineers knew that a conventional thick film substrate would not fit the bill. Sound Design's customer desired a CSP-sized package for a complex multi-chip configuration. To achieve this, Sound Design relied on a 3D chip stacking architecture which utilized their patented thin film capacitor technology (thinSTAX™).

Very high interconnect density was also required at the substrate level in order to meet the overall size requirements of an in-the-ear hearing aid application. Sound Design began searching for a solution that could combine the well-known benefits of ceramic-based substrates with next-generation density capabilities.

#### Solution

##### DuPont Microcircuit Materials System

Sound Design turned to DuPont Microcircuit Materials to help create the solution. Sound Design chose a system utilizing DuPont 7988 through-hole plug, QM44F photoimageable multilayer dielectric, and QG150 etchable gold conductor. Sound Design's longstanding expertise in both thick- and thin-film processing, combined with the DuPont innovative materials system, provided the winning solution to this circuit design. Sound Design etches QG150 conductor to one mil (0.001 inch, or 25 micron) lines and spaces, and photoimages QM44F to less than four-mil (<0.004 inch, or 100 micron) vias. The result is an unprecedented level of substrate interconnect.



7988 through-hole plug

QG 150 etchable gold conductor

QM 44F photoimageable dielectric



Sound Design Example of Chip Stacking



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Sound Design has also found that using the DuPont system has provided other benefits. Downstream assembly efficiencies, yields and tolerances can be improved due to more precise feature definition as well as to the elimination of pattern distortion, screen stretch, and layer-to-layer alignment issues that are common to traditional thick film approaches. Also, DuPont 7988 through-hole plug, a no-shrink material with excellent electrical properties, provides Sound Design with a planar surface, eliminating issues in etch resist application.

In addition, Sound Design is taking advantage of the improved wiring density the DuPont system offers to reduce the number of routing layers required. This shortens design and substrate manufacturing cycle times. It also reduces the thickness of the finished substrate and typically of the overall package. Sound Design is selectively redesigning some of its current product offerings, utilizing the 7988/QG150/QM44F approach in order to capitalise on these advantages.

"DuPont's HD substrate system, complemented by our own core competencies in thick- and thin-film processing, have provided us with a high value, high density interconnect substrate," says Mark Vandermeulen, Sound Design's manager of technology. "We expect to continue to leverage the combination of this substrate platform and our other advanced packaging capabilities into leading-edge miniaturized packaging solutions for existing and future markets."

Sound Design Technologies, a Canadian high technology company, designs, manufactures and markets silicon integrated circuits and modules, as well as thick- and thin-film hybrid circuits, for a variety of specialised applications.

For more information, visit Sound Design Technologies at [www.sounddesigntechnologies.com](http://www.sounddesigntechnologies.com).

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