DUPONT

Horizons no.23

Global edition
October 2004

DuPont Thick Film News
www.dupont.com/mcm

The business outlook is brightening...

It is a great honour for me to be appointed global business director for DuPont Microcircuit Materials (MCM). Our mission is to leverage our 65 years in the electronics industry to develop innovative microcircuit materials for new applications, to be the most reliable supplier of high quality products, and to make it possible for our customers to achieve higher growth, reliability, and profitability.

This spring brought encouraging news and continuing signs of recovery since the 'bottoming out' in 2002. Consumer and business confidence has improved and global electronic equipment shipments and orders are rising. Clearly, we are getting back on track.

According to the Semiconductor Industry Association (SIA), worldwide sales of semiconductors reached $17.3 billion in May, their highest level since December 2000.

The main products driving this growth have been flat panel displays and wireless communications – digital signal processors (DSPs), opto-electronic devices, and application-specific products for cellular phones with enhanced display, imaging and data capabilities.

Plasma displays continue to surge due to the strong demand from the home entertainment market, with PDP shipments estimated to rise at a compound annual growth rate (CAGR) of 52 per cent to 13.6MM units in 2008, according to DisplaySearch.

DuPont appreciates all the support it has received from

continued on page 2

Walt Cheng was appointed global business director of DuPont Microcircuit Materials on July 1 of this year, succeeding Harold L. (Hal) Snyder, who has become global technical director of DuPont Fluoroproducts. Walt will continue to be based in Taiwan.

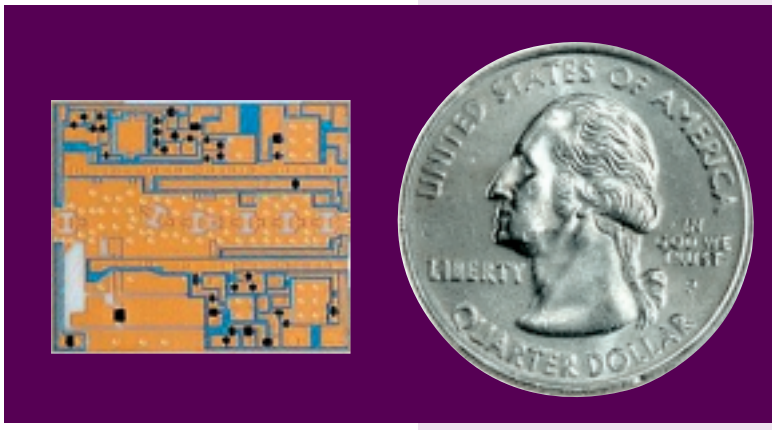
Walt Cheng has extensive experience in the microcircuits industry, having joined DuPont Taiwan in 1980 as a technical representative for MCM. After this, he moved to the DuPont technical centre in Japan as technical service supervisor and then became sales and marketing manager of DuPont Electronic Materials. He was later appointed managing director of several DuPont joint ventures in the region. Prior to his new assignment, he was regional director for MCM in Asia/Pacific.

We thank Hal for his many contributions to MCM, and wish Walt every success in his important new role.

Aeroflex chooses thick film for RF microwave package application above 10 GHz

Aeroflex Microelectronic Solutions, based in Plainview, New York, is one of the leading companies offering radio frequency/microwave packaging solutions to the telecommunications, military and aerospace markets. It recently selected DuPont thick film technology for a complex new integrated RF package designed to operate at above 10 GHz. DuPont thick film materials delivered several benefits to Aeroflex's RF design engineers, such as higher levels of integration, lower power consumption, smaller size and faster time to market.

The Aeroflex RF package requirement for high density integration at very high frequencies of 10 to 65 GHz included the combination of analogue and digital circuitry on the same substrate. This unique design approach meant that the design engineer had to control several factors such as thermal dissipation, unwanted cross-talk from the microwave signal, and the ability of the materials and package to handle the high density components from both a manufacturing and testing standpoint.



Aeroflex's new integrated RF package is designed to operate at above 10 GHz.

DuPont thick film materials were selected because they allowed Aeroflex to combine established multilayer materials, including resistors, with new, state-of-the-art gold conductor technology for fine line screen printing and for substrate through-hole filling. "The ability of DuPont to bridge old and new technologies has enabled Aeroflex to develop a unique cost-effective solution for our customer," says Richard Schwartzman, director of process engineering.

continued on page 2

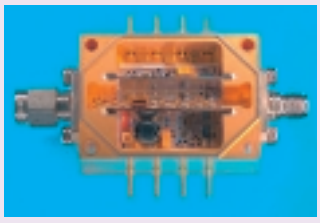
Aeroflex chooses thick film for RF microwave package application above 10 GHz

continued from cover page

The primary microwave conductor tracks are made of DuPont QG150 gold conductor, which is screen printed directly onto the alumina substrate to provide the shortest ground returns and the most efficient heat dissipation for the RF components. The excellent line resolution and spacing constraints made possible with QG150 are vital to the circuit's high frequency performance. "Line resolution and spacing have been critical to the performance of the circuit, and DuPont thick film material met the challenge," continues Richard Schwartzman.

The analogue tracks of QG150 are printed on top of a layer of DuPont 5704 multilayer dielectric, permitting the isolation of the control circuitry from the underlying microwave tracks, thus preventing unwanted signal interaction. Interconnect vias, made of DuPont 5727 gold via fill, are used to bring the control signals to the appropriate nodes. A three-dimensional architecture is achieved by nested layering, maximising circuit density.

The Aeroflex circuit dissipates about 4 watts of DC power and 24 dBm of RF power, and the challenge was to keep this heat away from the components and the control circuits. The heat transfer was made possible by positioning the most critical dies over thermal vias in the alumina substrate, which are filled with DuPont TH035 gold through-hole conductor. This through-hole design has allowed the module to survive 1,000 hours at 125°C, under full load. In addition, other gold-filled through-holes could be strategically placed for RF grounding purposes.



View of Aeroflex's RF package.

Blends of various members of DuPont 1900 Series resistors, ranging from 10 Ω to 100 KΩ/sq., have been used to replace discrete chip resistors for both the microwave biasing and control circuitry functions (as shown in the photo on page 1). The resistors are laser-trimmable to a tolerance of 1 per cent.

The process of choosing the combination of materials to meet the demands of the RF package was accomplished by Aeroflex and DuPont working closely together to quickly solve any design or manufacturing issues that developed. "The DuPont technical and sales organisation was always available to answer our questions and to lend a helping hand," says Nick Moriates, thick film manufacturing supervisor.

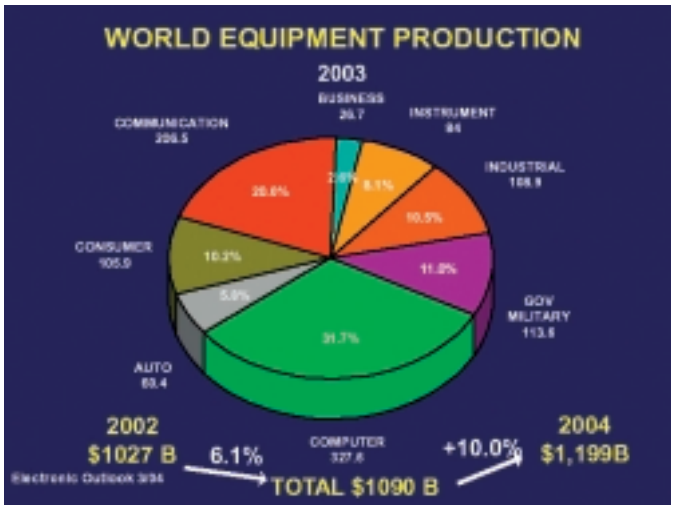
In short, Aeroflex's unique RF design and manufacturing capability combined with DuPont thick film technology were able to deliver several advantages to the customer. These include the integration of mixed signals at high frequencies, lower cost, due to the one housing and one board approach, reduced size, due to the multilayer substrate with printed components, lower power consumption, due to fewer losses in the connections, and higher performance, because of shorter bonds and better power management.

The business outlook is brightening...

continued from cover page

its customers over the past year. This confidence has enabled us to implement our SAP system, which has greatly improved our ability to manage inventories and track orders. As we further develop our expertise with SAP, we anticipate that the system will create opportunities to streamline the ways we do business and reduce our costs of doing business.

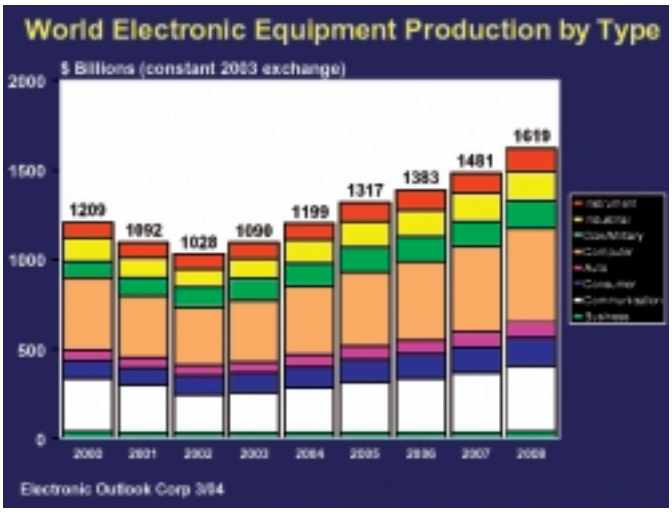
In addition, aggressive adoption of Six Sigma methodology has given us new tools to improve our quality on a continuous basis, and to expand capacity in Europe, Asia and North America.

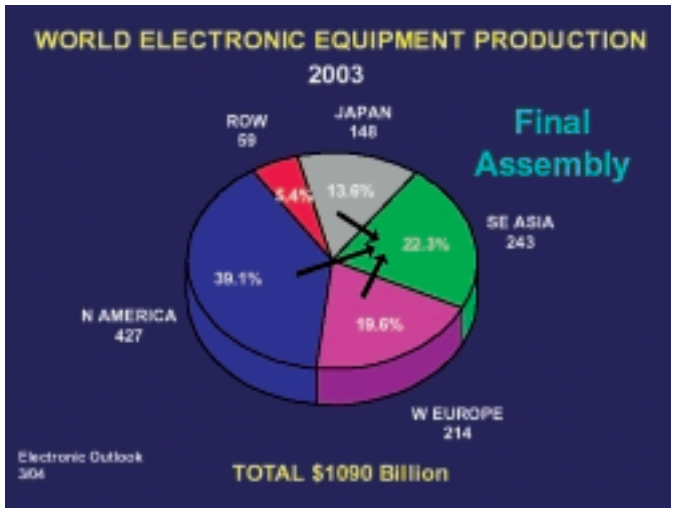


For 2005, we will be launching exciting new products for flat panel display applications that improve performance and increase yields. This builds upon product introductions in the past year, which have included a new Low Loss LTTC Green Tape™ materials system and a complete thick film materials system for aluminium nitride substrates.

In short, we continue to be optimistic about the future, and look forward to working with you so that we may achieve success together.

Walt Cheng
Global business director
DuPont Microcircuit Materials





Source of charts: Custer Consulting Group, June 2004