

Microelectronics Packaging & Test Engineering Council



**MEPTEC Report Advertising**  
Monthly Email Updates

ABOUT MEPTEC CONTACT US ADVISORY BOARD

JOIN MEPTEC  
MEMBER SERVICES  
EVENTS CALENDAR  
MEPTEC REPORT  
ADVERTISING/MARKETING  
EVENT SPONSORSHIP  
DOWNLOAD LIBRARY

Join our MEPTEC email list  
[Form]

**Welcome to MEPTEC**  
MEPTEC (Microelectronics Packaging and Test Engineering Council) is a trade association of semiconductor suppliers, manufacturers, and vendors concerned exclusively with packaging, assembly, and test. Since its inception over 30 years ago, MEPTEC has provided a forum for semiconductor packaging and test professionals to learn and exchange ideas that relate to packaging, assembly, and test. Through our monthly luncheons, symposiums, and an Advisory Board consisting of individuals from all segments of the semiconductor industry, MEPTEC continuously strives to improve and elevate the roles of assembly and test professionals in the industry.

**UPCOMING MEPTEC EVENTS**  
MEPTEC 2017  
**SEMICONDUCTOR PACKAGING SYMPOSIUM**  
HETEROGENEOUS INTEGRATION - THE ROAD TO IMPLEMENTATION  
**11.30.2017**

Read Current Issue Online  
Download Current Issue

Learn More  
[www.CCGA.co](http://www.CCGA.co)

Click Here  
For ALL your Handling Needs!

# MEPTEC Report

A Quarterly Publication of the Microelectronics Packaging & Test Engineering Council Volume 21, Number 2

**FAILURE ANALYSIS**  
A Tool for Developing New MEMS Sensors  
page 24

**2017 Semiconductor Industry Equipment and Materials Outlook**  
page 14

**MEPTEC MEMBER COMPANY PROFILE**  
Located in Itasca, IL, just outside of Chicago, Kester's center of excellence houses their global manufacturing for many of their products as well as centralized R & D staff and application equipment, technical support labs and product management capabilities.  
page 16

**INSIDE THIS ISSUE**

**20** Miniaturization spurs EMI emission at the package level.

**23** Are trade secrets a better alternative to patents?

**30** Advanced packaging technologies get reliability boost from NCF material.

**34** The demand for external consultants is growing as evidenced by reports from Technova Consulting and others.

A SPECIAL TWO-DAY TECHNICAL CONFERENCE

2013 MEPTEC  
**MEDICAL TECHNOLOGY CONFERENCE**  
Global Momentum in the Medical Industry - Convergence of Electronics, Biology and Health

San Jose, CA  
San Jose, CA  
San Jose, CA

**9.17.13**

A SPECIAL ONE-DAY TECHNICAL SYMPOSIUM

2013 MEPTEC  
**SEMICONDUCTOR ROADMAPS SYMPOSIUM**  
A Collaborative Update from Standards Bodies, Industry Groups, and the Entire Supply Chain

San Jose, CA  
San Jose, CA

**9.24.13**

A SPECIAL ONE-DAY TECHNICAL SYMPOSIUM

Twelfth Annual MEPTEC  
**MEMS TECHNOLOGY SYMPOSIUM**  
ADVANCES IN MEMS - Foundations of Design, Process, Packaging and Test

San Jose, CA  
San Jose, CA

**5.22.14**

A SPECIAL ONE-DAY TECHNICAL SYMPOSIUM

2014 MEPTEC  
**SEMICONDUCTOR PACKAGING TECHNOLOGY SYMPOSIUM**  
Pushing the Limits in Packaging Design and Manufacturing

San Jose, CA  
San Jose, CA

**10.23.14**

A SPECIAL ONE-DAY TECHNICAL SYMPOSIUM

14th ANNUAL MEPTEC  
**MEMS TECHNOLOGY SYMPOSIUM**  
Enabling the Internet of Things: Foundations of MEMS Process, Design, Packaging & Test

San Jose, CA  
San Jose, CA

**5/20/15**

# WELCOME

A SPECIAL TWO-DAY TECHNICAL CONFERENCE

2013 MEPTEC  
**MEDICAL TECHNOLOGY CONFERENCE**  
Global Momentum in the Medical Industry - Convergence of Electronics, Biology and Health

ASU **sbhse**  
Arizona State University School of Biodesign and Health Systems Engineering

Tuesday, September 17th  
Wednesday, September 18th

Corporate Sponsors:  
3M, Amkor Technology, CORWIL, HESSE MECHATRONICS, invenios, ITO, Medtronic, mjs, MST, PAC TECH USA, PROMEX, Sonoscan, VISIONTECH

MEPTEC semi

## THE GREAT MINIATURIZATION: SYSTEMS AND PACKAGING

Technology Enabling Systems in your Pocket and Beyond

PARTICIPATING COMPANIES:

- ADVANCED BIONICS
- ALTERA CORPORATION
- AMKOR TECHNOLOGY
- ANALOG DEVICES, INC.
- ASE (US) INC.
- ASE TAIWAN
- CACTUS SEMICONDUCTOR INC.
- CADENCE DESIGN SYSTEMS, INC.
- GEORGIA INSTITUTE OF TECHNOLOGY
- GLOBALFOUNDRIES INC.
- JAWBONE
- KYOCERA CORPORATION
- MULTEK CORPORATION
- SARGINA TECHNOLOGY LLC
- SILICIUM ENERGY
- SILICON CATALYST
- STANFORD UNIVERSITY
- TECHSEARCH INTERNATIONAL, INC.
- XILINX INC.

NOVEMBER 10 & 11, 2015 BILTMORE HOTEL, SANTA CLARA, CA

Diamond Sponsor: ASE GROUP

Gold Sponsor: Amkor Technology, Kulicke & Soffa, SMART MICROSYSTEMS

Reception Sponsor: ACL

Association Sponsor: GSA

Main Sponsors: Chip Scale Review, CIRCULARS ASSEMBLY, GLOBAL, IConnect007, Micronews, MEMS JOURNAL, semiconductor packaging news, TAP TIMES



## Contact Information

---

### **MEPTEC HOME OFFICE**

315 Savannah River Dr., Summerville, SC 29485

#### **Bette Cooper / President**

650-714-1570

Fax: Toll free 1-866-424-0130

bcooper@mepotec.org

#### **Gary Brown / Director of Operations**

650-714-1577

Fax: Toll free 1-866-424-0130

gbrown@mepotec.org

### **SALES**

#### **Gina Edwards / Sales Manager**

408-858-5493

Fax: Toll free 1-866-424-0130

gedwards@mepotec.org

---

About MEPTEC	1
<hr/>	
Advertising Opportunities	
<hr/>	
MEPTEC Report Newsletter	2
<hr/>	
Distribution	3
<hr/>	
Advertising Rates and Deadlines	4
<hr/>	
Advertising Specifications	5
<hr/>	
Technitorials	6
<hr/>	
1/6 Page Ad Artwork Production Services	7
<hr/>	
Marketing Opportunities	
<hr/>	
Web Banner Advertising	8
<hr/>	
Email Banner Advertising	9
<hr/>	
MEPTEC Event Sponsorship	10
<hr/>	
MEPTEC Event Exhibiting Opportunities	11
<hr/>	

MEPTEC (Microelectronics Packaging and Test Engineering Council) is a trade association of semiconductor companies and professionals involved in the manufacturing, packaging, assembling and testing of integrated circuits.

Since its inception 40 years ago, MEPTEC has provided a forum for the semiconductor industry to learn and exchange ideas through our monthly luncheons, conferences, and our quarterly publications, the MEPTEC Report. With the help support of an Advisory Board consisting of individuals from all segments of the industry, MEPTEC has, over the years, kept current not just with with not just semiconductor industry developments, but has expanded its scope to cover relevant industry segments such as MEMS and medical electronics.



The MEPTEC Report is published four times per year as a service to MEPTEC members and supporters. The full color publication features articles on cutting edge technology, guest editorials, industry developments, and other news applicable to major issues surrounding the world of semiconductor assembly and test.

Our primary goal has been to make the MEPTEC Report a marketing tool for MEPTEC member companies. Priority coverage is given to member companies' products, services, and technology development. Advertising in the MEPTEC Report is very cost effective when compared to other trade journals, and reaches a very targeted audience of loyal readers. With the addition of a digital edition the MEPTEC Report reaches an ever increasing audience.



**MATERIALS**

3D Architectures for Semiconductor Integration and Packaging

3D ASIP December 11-13, 2013, Burlingame, California

The Technology and Market Landscape for Device and Systems Integration and Interconnect

This conference provides a unique perspective of the emerging commercial opportunities of 3D integration and packaging—encompassing design, business, research, development, and production. The highly interactive sessions will feature the information needed to gain an edge in this competitive market.

For more information visit: [www.3dasiip.org](http://www.3dasiip.org)

**OPINION**

Do MEMS Work For You?

MEMS (Micro-Electro-Mechanical Systems) are small, intricate devices that combine mechanical, electrical, and fluidic systems on a single chip. They are used in a wide range of applications, from automotive airbag sensors to medical implants.

MEMS devices are becoming increasingly important in many industries, including automotive, aerospace, and consumer electronics. They offer several advantages, including small size, low power consumption, and high reliability.

However, there are also challenges associated with MEMS, such as high manufacturing costs and limited design flexibility. As the technology continues to advance, it is expected that MEMS will play an even larger role in many industries.

**Amkor Technology**

**BIG FIVE PACKAGES**

Packaging Solutions for Smartphones and Tablets

- Wafer Level Chip Scale Packages
- Laminate-Based Advanced SIP
- Water-Based Advanced Flip
- Low-Cost Flip Chip
- MEMS

Enabling a Smart World

As one of the world's largest suppliers of outsourced semiconductor packaging, design, assembly & test services, Amkor helps make "next generation" products a reality.

**CONNECTING** People and Technology

[www.amkor.com](http://www.amkor.com)

Print copies of the MEPTEC Report are distributed directly to all MEPTEC members. Additionally, thousands of bonus copies are distributed at major industry events throughout the year. The MEPTEC Report is also available as a digital publication distributed at no charge through the MEPTEC website.

#### Bonus Event Distribution

- All MEPTEC Symposiums and Luncheons
- APEX Expo & Conference
- ECTC / Electronic Components and Technology Conference
- IMAPS Device Packaging Conference & Exhibition
- IMAPS International Symposium on Microelectronics
- IWLPC / International Wafer Level Packaging Conference
- RTI 3D Architecture Conference
- SEMICON West
- SMTA International Exposition and Conference
- SMTA Pan Pacific Microelectronics Symposium & Exhibition

## MEPTEC Report Advertising Rates and Deadlines

Rates are effective with advertising placed in the MEPTEC Report beginning Spring 2018 Issue.

<b>Four Color Rates</b> (per insertion)	Standard Rate	<i>Discounted Member Rate</i>
2 page Technitorial Spread	\$2750	<b>\$2500</b>
Full page	\$1815	<b>\$1695</b>
2/3 vertical	\$1395	<b>\$1245</b>
1/2 vertical or horizontal	\$1180	<b>\$1070</b>
1/3 vertical or square	\$1025	<b>\$920</b>
1/4 vertical	\$885	<b>\$770</b>
1/6 vertical	\$350	<b>\$250</b>

<b>Black &amp; White Rates</b> (per insertion)	Standard Rate	<i>Discounted Member Rate</i>
Full page	\$1180	<b>\$1070</b>
2/3 vertical	\$925	<b>\$820</b>
1/2 vertical or horizontal	\$745	<b>\$645</b>
1/3 vertical or square	\$595	<b>\$495</b>
1/4 vertical	\$450	<b>\$345</b>

### Additional Discounts

A 15% discount will be allowed on pre-paid advertising for four issues or more.

### Bleed Charges

No charge for bleed on full-page, 2/3, 1/2 and 1/3 page ads. Bleed not available on 1/4 and 1/6 page ads.

### Special Positions

Special positions are available at a premium of 10% of the space rate and include inside front cover, inside back cover, and back cover.

<b>Deadlines</b>		
Spring 2018 Issue	Ad space close: 2/9	Materials due: 2/16
Summer 2018 Issue	Ad space close: 5/11	Materials due: 5/18
Fall 2018 Issue	Ad space close: 8/10	Materials due: 8/17
Winter 2018 Issue	Ad space close: 11/9	Materials due: 11/16

Contact: [gedwards@meptec.org](mailto:gedwards@meptec.org)





**SMART MICROSYSTEMS**  
Your Microelectronic Package Assembly Solution for MEMS Sensors

## Considerations for an Effective MEMS Die Attach Strategy

WILLIAM RYAN  
SMART MICROSYSTEMS, LLC

**THE ATTACH METHOD IS IN EVERY** very fundamental to MEMS product design. Unfortunately, during the early product development and design phase of a new MEMS product, very little is known about the die attach strategy. Given enough resources, it is possible to create a die attach method that will provide the necessary strength, bonding, and adhesion. The focus of this article will be on one of the most popular methods, adhesive die attach. In the realm of adhesive die attach there are many types of adhesives that can be used to attach the die. Each type of adhesive has its own unique properties that will ultimately affect the product function or production process. These properties include adhesion, rigidity, viscosity or dispense, working life, cure method, and cure temperature. Each of these parameters (as well as some not mentioned here) need to be carefully considered.

**Adhesion**  
Fundamentally all die attach methods must serve as a permanent bond to the package. Many of the MEMS die found in today's systems are based on the attach method to provide a proper bond and avoid the lead path. If the die attach method is not a lead path, then it must also have adequate adhesion to form a proper seal around the bonded perimeter of the MEMS die. Die that require lead wire are typically precision mounted. In addition to using a lead wire the attach material is also a pressure seal. In these cases, adhesion to the die and the package is vital. To use lead attach adhesives a clear resin can be used. This resin will automatically clear the air off of the package, remove the flux, and provide the desired bond. It is important that the clear resin cures to exactly the thickness required to seal the gap for the geometry of the part. It is also important to realize that the die attach material can be an important factor in the product design. This is a factor that can often get overlooked on the line or second design iteration. If the part is too rigid then there is a real possibility that stress on the outside package will affect the MEMS die output. This is known as a potential strain induced effect. In some cases, if the bond is not stiff enough, the opposite can occur. The MEMS die will experience movement in the package during presentation, vibration, or mechanical shock. This will affect the life of the sensor and contribute to possible offset drift. It is important to select the proper adhesive for the application and the life of the sensor.

**Dispense and Working Life**  
Since the die attach process is dispensed in place or spot of assembly, the viscosity and working life of an adhesive are critical material properties that can have a significant impact on the assembly process. The amount of material required to attach the die and form a seal is governed by the geometry of the part and the viscosity of the adhesive. If

**Figure 1. Shows rearrangement for assembling die attach method.**

28 MEPTEC REPORT FALL 2017

**SMART MICROSYSTEMS**  
Your Microelectronic Package Assembly Solution for MEMS Sensors

## Custom Microelectronic Assembly

PROTOTYPE DEVELOPMENT • ENVIRONMENTAL LIFE TEST • MANUFACTURING SERVICES

SMART Microsystems provides custom assembly services for microelectronics, sensors, and MEMS. Our customers are producers, manufacturers, and suppliers who need microelectronic sub-assemblies for products in high-value, low-volume market applications. These customers are developing innovative products for a wide variety of markets, including aerospace, automotive, defense, biomedical, and industrial control. SMART Microsystems has an experienced technical team, state-of-the-art equipment, and found new facilities that provide contract services for prototype development, environmental life testing, and manufacturing.

Call us today at 440-386-4202 or visit our website for more information about SMART Microsystems capabilities and services.

ISO 9001

SMART Microsystems Ltd. 141 Innovation Drive, Itasca, Ohio 44135  
Telephone: 440.386.4202 info@smartmicrosystems.com  
www.smartmicrosystems.com

- Test & Inspection
- Dicing
- Die Attach / Flip Chip
- Wire Bonding
- Encapsulation
- Environmental Life Test

**SMART MICROSYSTEMS**

Promote your products or services with this unique advertising opportunity. Each MEPTEC Report issue will contain a limited number of “technitorial” features which will highlight different aspects of technology relevant to assembly, packaging and test. The feature will include a right-hand placed full page, four-color advertisement, and a facing full page write-up. Priced at the low cost of \$2,500.00, it is essentially two full pages of advertising for the price of 1-1/2 pages.

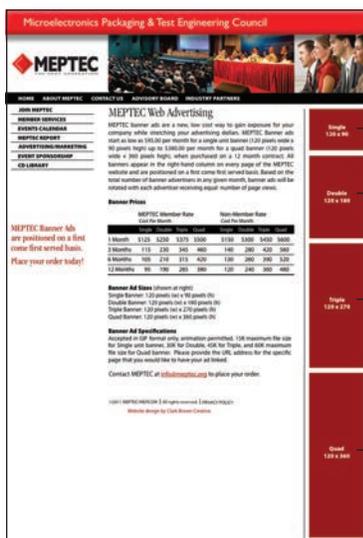
### What is a Technitorial?

A technitorial is a full page write-up provided by the advertising company that is a complementary technical piece to the full page advertisement, describing the company’s products or services, non-commercial in nature. It will educate and inform the reader, yet will be subtly slanted towards the company’s technology by being placed next to the company’s full page advertisement. The article will not mention the advertising company’s name, but a by-line and contact information will be allowed.

Contact Gina Edwards at [gedwards@meptec.org](mailto:gedwards@meptec.org) for availability and to place your order.



MEPTEC banner ads are a low cost way to gain exposure for your company while stretching your advertising dollars. MEPTEC Banner ads start as low as \$95.00 per month for a single unit banner, up \$380.00 per month for a quad banner, when purchased on a 12 month contract. All banners appear in the right-hand column on every page of the MEPTEC website and are positioned on a first-come first-served basis.



### Banner Ad Sizes

Single Banner: 120 pixels (w) x 90 pixels (h)

Double Banner: 120 pixels (w) x 180 pixels (h)

Triple Banner: 120 pixels (w) x 270 pixels (h)

Quad Banner: 120 pixels (w) x 360 pixels (h)

### Banner Ad Specifications

Accepted in GIF format only, animation permitted. 15K maximum file size for Single unit banner, 30K for Double, 45K for Triple, and 60K maximum file size for Quad banner. Please provide the URL address for the specific page that you would like to have your ad linked.

Banner Prices	MEPTEC Member Rate (cost per month)				Non-Member Rate (cost per month)			
	Single	Double	Triple	Quad	Single	Double	Triple	Quad
1 Month	\$125	\$250	\$375	\$500	\$150	\$300	\$450	\$600
3 Months	115	230	345	460	140	280	420	560
6 Months	105	210	315	420	130	260	390	520
12 Months	95	190	285	380	120	240	360	480

Contact Gina Edwards at [gedwards@meptec.org](mailto:gedwards@meptec.org) to place your order.

A limited number of MEPTEC Monthly Update Email Banner Ads are now available to MEPTEC Members only. These banner ads cost \$45.00 per month for a single unit banner, or \$450.00 for 12 months when purchased on a 12 month contract. All banners appear in the left-hand column and are positioned on a first-come first-served basis. A maximum of 10 banners will appear on each Monthly Update email. Current monthly distribution numbers approximately 4500 recipients.

**Banner Ad Size**

120 pixels (w) x 90 pixels (h)


**Banner Ad Specifications**

Accepted in GIF format only, animation permitted. 15K maximum file size for single unit banner. Please provide the URL address for the specific page that you would like to have your ad linked.

Banner Prices	Available to MEPTEC Members Only Single Unit Banner
1 Month	\$45.00 per month
12 Months	\$37.50 per month

Contact Gina Edwards at [gedwards@meptec.org](mailto:gedwards@meptec.org) to place your order.

MEPTEC offers a variety of event sponsorship opportunities for its technical symposiums. Event sponsorship provides a valuable opportunity to promote your company brand and product or service message to attendees while supporting your business development and positioning goals.

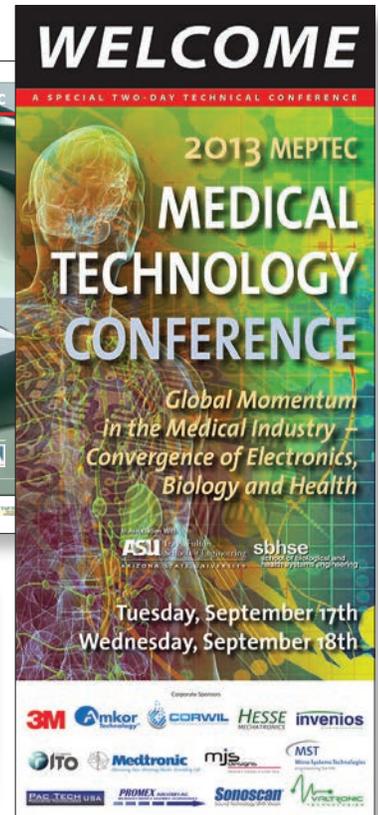
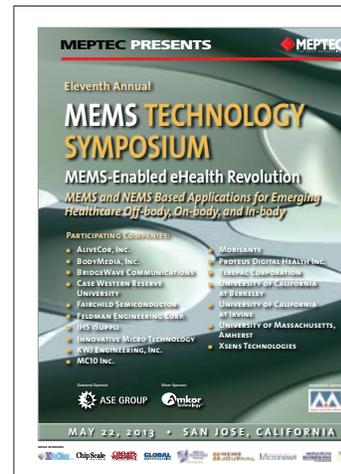
Typical Sponsorship Benefits include:

**Platinum Sponsor: \$3,250 - 3 available per event**

- Company name & logo listed as Platinum Sponsor on all promotional materials, including email and web promotions
- Full-page black & white ad in event proceedings
- 3 free admissions to symposium
- 1 tabletop exhibit display at event
- Featured as Platinum Sponsor in symposium proceedings
- 1 CD of symposium proceedings
- Company logo/description displayed on video screen at beginning of event
- Signage recognition at event
- Exposure in semiconductor industry trade magazines (deadline restrictions)
- Discount on future MEPTEC Report 1/2 page or larger, 4-color ad

**Gold Sponsor: \$2,500 – 5 available per event**

- Company name & logo listed as Sponsor on all promotional materials, including email and web promotions
- Full-page black & white ad in event proceedings
- 2 free admissions to symposium
- 1 tabletop exhibit display at event
- Featured as Gold Sponsor in symposium proceedings
- 1 CD of symposium proceedings
- Company logo/description displayed on video screen at beginning of event
- Signage recognition at event
- Exposure in semiconductor industry trade magazines (deadline restrictions)
- Discount on future MEPTEC Report 1/2 page or larger, 4-color ad



**Silver Sponsor: \$1,250 – 10 available per event**

- Company name & logo listed as Sponsor on all promotional materials, including email and web promotions
- 1/2 page black & white ad in event proceedings
- 1 free admission to symposium
- Featured as Sponsor in symposium proceedings
- 1 CD of symposium Proceedings
- Company logo/description displayed on video screen at beginning of event
- Signage recognition at event
- Exposure in semiconductor industry trade magazines (deadline restrictions)

*Note: Sponsorship pricing and benefits may vary from event to event. For specific sponsorship details and more information contact Gina Edwards at [ggedwards@meptec.org](mailto:ggedwards@meptec.org).*

## MEPTEC Event Exhibiting Opportunities

---

MEPTEC offers table top exhibit opportunities at its technical symposiums throughout the year. A limited number of table-top exhibit spaces are available on a first-come, first-served basis. Each draped table is 2-6 x 6-0. The cost includes a table and chairs, a complimentary table top sign, company description in the Symposium proceedings, and one complimentary admission to the symposium. You may use your table to display literature, parts, small pieces of equipment, table top display signs, etc. A table top sign will be provided, but you may also wish to display a banner or some other appropriate type of sign on the front or top of the table.

Visit the MEPTEC website for currently scheduled events.

For more information contact Gina Edwards at [gedwards@meptec.org](mailto:gedwards@meptec.org).