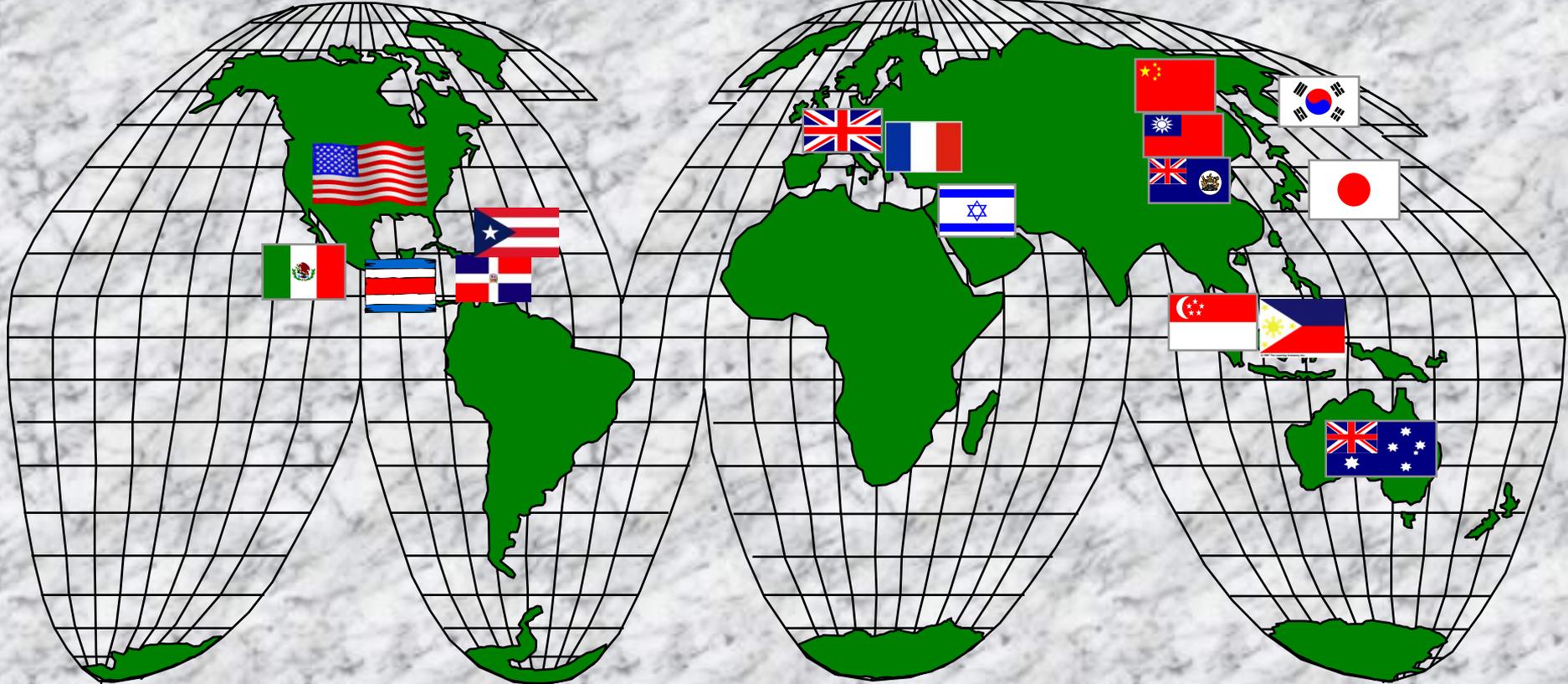
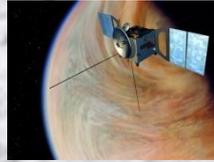
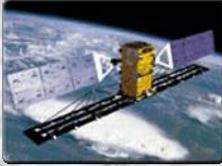


# MICROCOAT TECHNOLOGIES



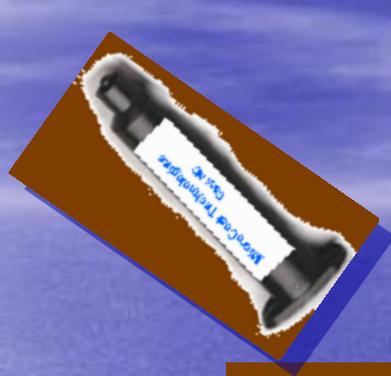
McKinney, Texas, Cheshire, CT, Morrisville, NC USA

<http://www.m-coat.com>



# Just like an old friend, we can do it all

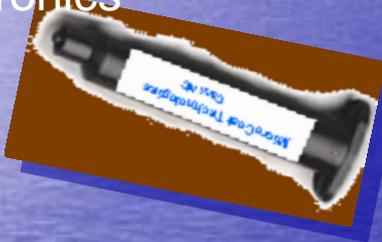
Military



Microelectronics



Electronics



Medical



Conductive silvers



Encapsulants



Optically clear



Conformal coatings



Glass Bonders



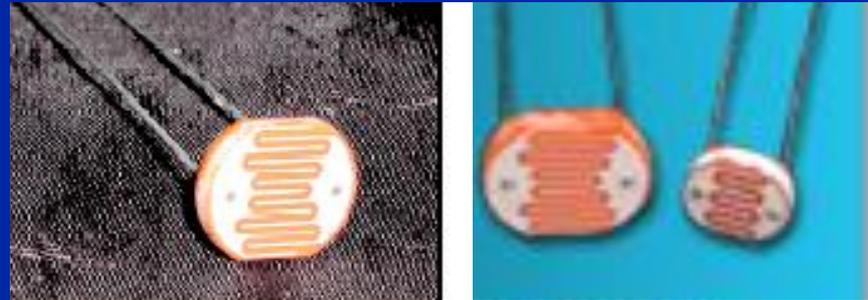
# Optically Clear Glob Tops for IC's, LED's, EPROMS, Etc.

## Without Silicone

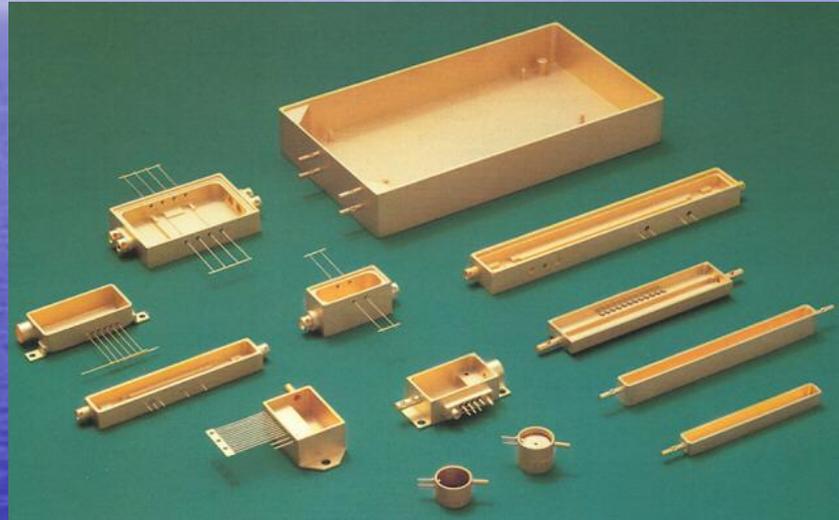
- ◆ Refractive Index 1.49 - 1.91!!!!!!
- ◆ Transmissivity @ 990nm 99%
- ◆ R-I 1.9 @ 850 nm
- ◆ Operating Temperature Range  
of -55C to +150C

UV Curable in < 20 seconds !

# Optically Clear UV Cured Photo Cell Coatings



# Optically Clear Coatings and Adhesives for;



Picture of Sinclair Manuf. Packages

- WADM Modules
- Modulators
- Attenuators
- Pump Lasers
- Switches
- Amplifiers

# Conductive, Non-Conductive, and Thermally Conductive Die Attach Adhesives

In electronics, thermal management is crucial in both the design of circuit-board assemblies and in the production of semiconductor materials. For PC boards a crucial aspect can be the heating or cooling power required to keep a circuit within its specified operating temperature range. In the manufacturing of silicon wafers it is important to maintain a very uniform temperature distribution across the wafer in order to achieve quality production processes and high yields.

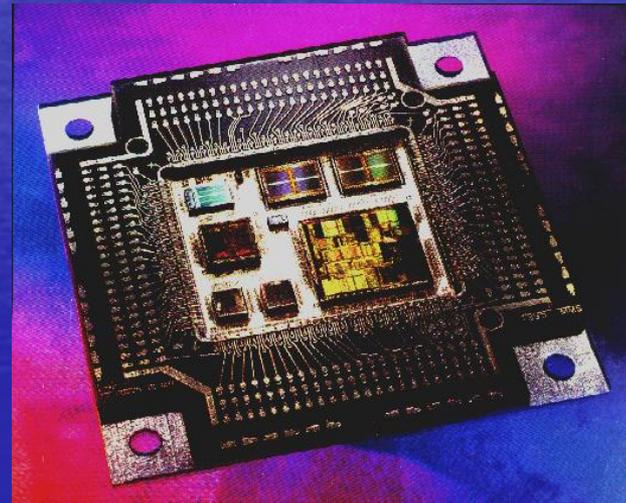
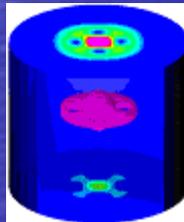
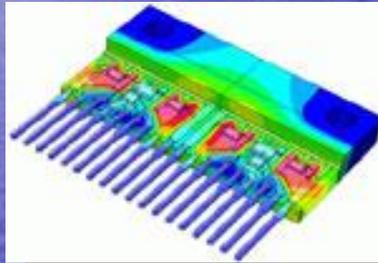
$\text{Al}_2\text{O}_3$

$\text{AlN}$

$\text{BoN}$

Diamond

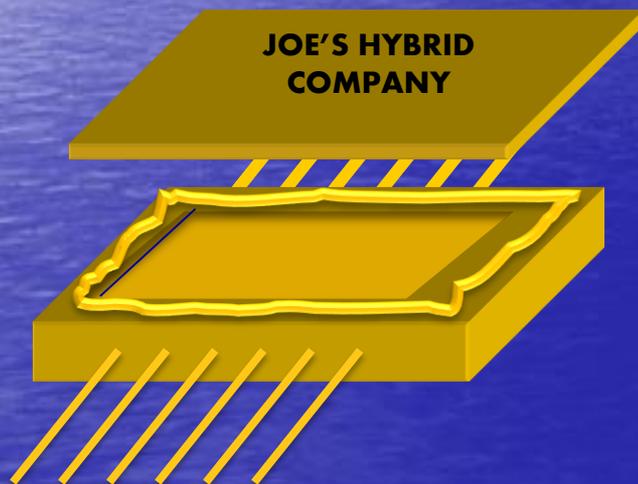
Ag



# Epoxy Sealing of Microelectronics, Semiconductors, Hybrids, and Power Devices

Non-conductive adhesives for lid sealing on any substrate surface;  
Ceramic, Kovar, LCP, etc. And also, substrate attach, die attach,  
etc. Passes gross leak, temp cycle, temp shock.

Withstands die attach to >320C



## **MCT 3417**

Hi Temp Sealing

Passes 320C Die Attach 5 minutes

Passes 350 Cycles -65C- +150C

Passes 85/85

Passes 883 Gross Leak

# Non- Conductive High Thermal Conductivity Die Attach Adhesive

## **MicroCoat 34-31-HTSM**

A Single Component, Toughened, Microelectronic Grade non-Conductive Die Attach Adhesive with a Service Temperature of  $<-65^{\circ}\text{C}$  to Over  $>340^{\circ}\text{C}$ , a Thermal Conductivity of **4W/mK** and Meets NASA Low Outgassing Specifications

MicroCoat 34-31-HTSM is an Aluminum Nitride filled die attach adhesive that features a unique blend of high performance properties including both high shear and peel strengths along with convenient handling and high/low temp properties. This is a one component system formulated to cure at elevated temperatures.

# Conductive Adhesives

- **SMD Attach To PCB and Ceramic**
- **Screen Printing Traces**
- **Die Attach**
- **Solder Replacement**
- **Flex Silver Traces**
- **Flex Carbon Traces**
- **Anti-Static**
- **Chip Component Termination**
- **Tantalum Capacitor Termination**
- **Static Discharge**
- **Platable For SMD Components**
- **Quick-Set PCB Repair**
- **Bio-Sensors**
- **Silver Spray-On**



Low Outgassing Die Attach Adhesives



UV/Heat Cure for High Accuracy Placement of Opto Devices



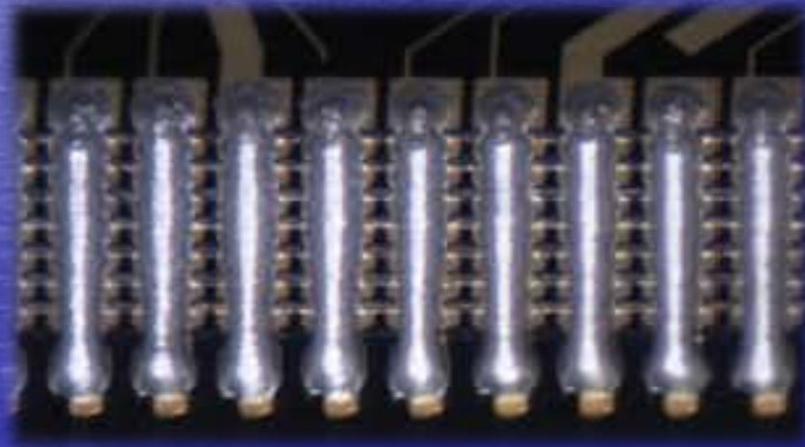
***A Very High Conductive & Thermally Conductive Die Attach  
Adhesive at >11W/mK –  
100% Solids and Used Consistently at Over 60GHz***

**MCT 2-0404E-HTC**

● **Composition Properties**

- Filler Contents: 85%-88% Silver
- Viscosity: 20-35 Kcps @ 10 RPM  
Brookfield HBT CP51 cone and plate.
- Thixo Ratio at above viscosity parameters 1.25 – 2.55
- Average Particle Size: <.70 – 1.25 microns
- 
- **Typical Cured Properties at Minimum Bond Line of 32 Microns**
- **Volume Resistivity:** <0.000055 Ω-cm
- **\*\*Thermal (Interfacial) Conductivity** 11.0 – 11.9 W/mK
- $T_g$  °C 128

We ARE 3D™

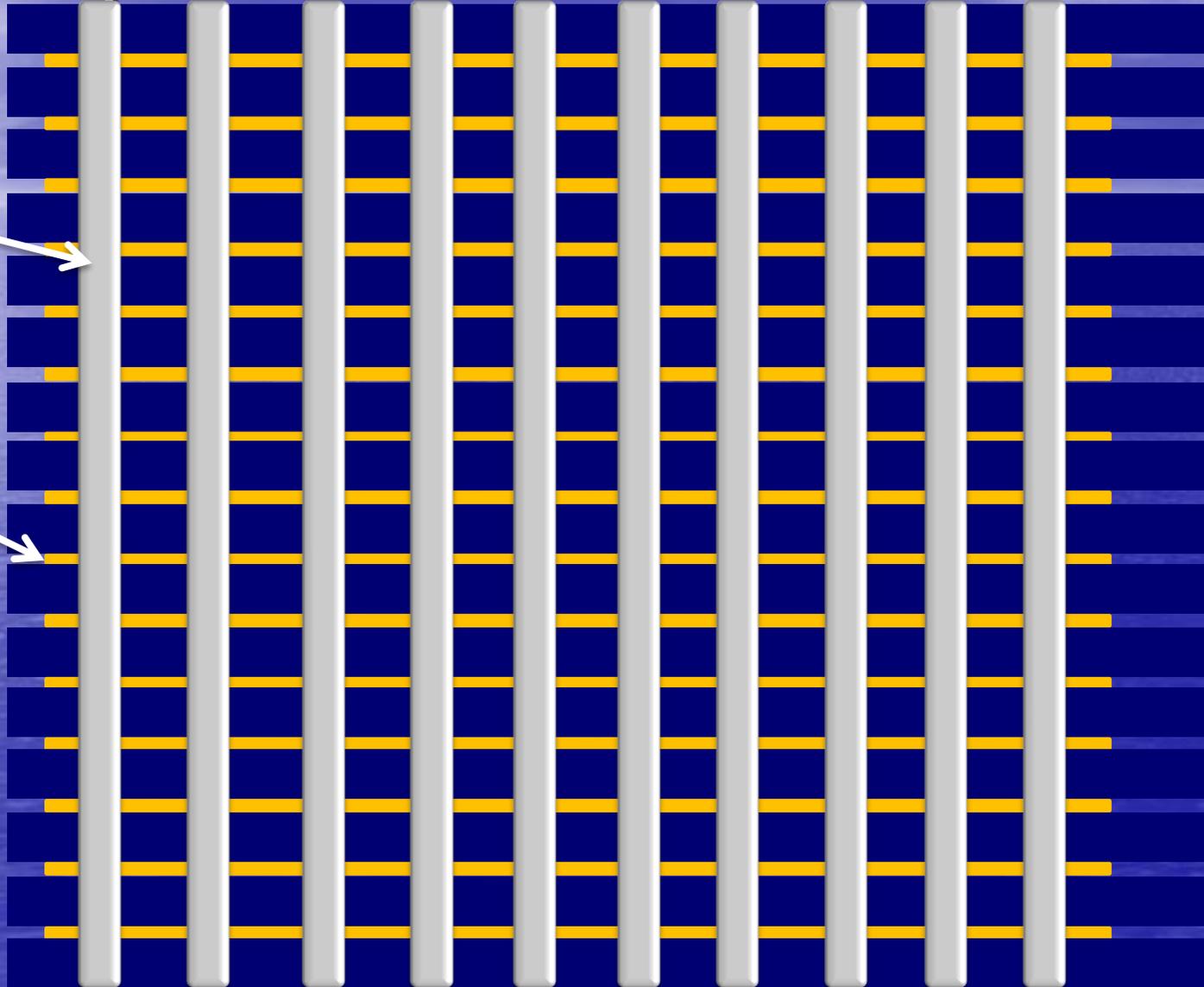


\*Photo courtesy of Vertical Circuits, Inc.

# 16 Layer Stacked Die With SD0802C

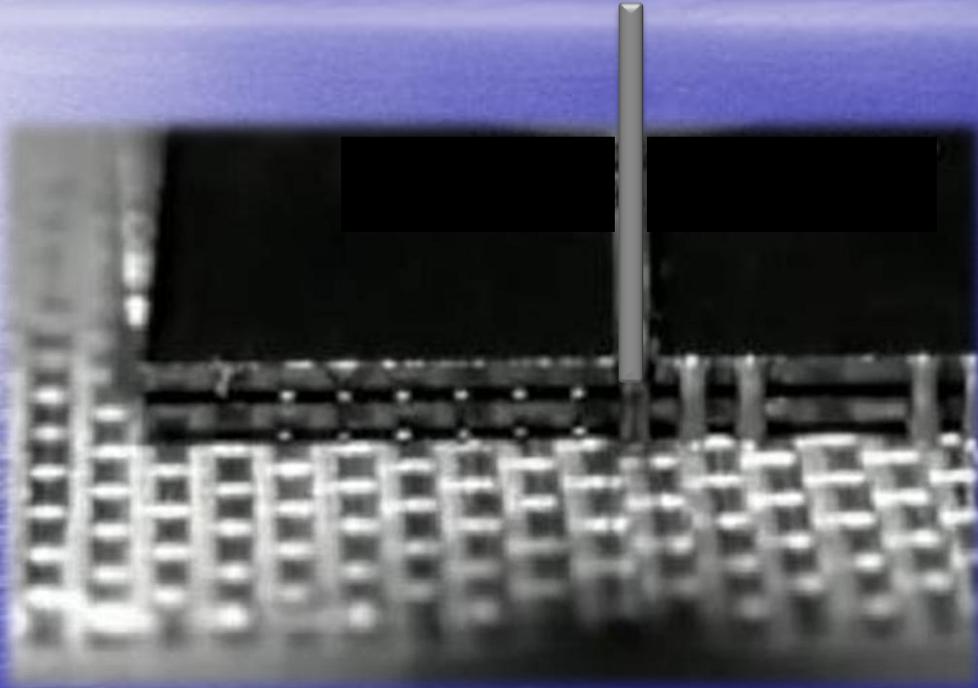
MCT SD0802C  
TC =  
>11.0W/mK

Non-Conductive  
Spacer



# MicroCoat SD0802C

## Dispensing Die Stacking Conductive Adhesive



# MicroCoat Technologies

1316 Somerset Drive McKinney, TX 75070 [www.m-coat.com](http://www.m-coat.com) Tel +1-972-678-4950 Fax +1-214-257-8890

*Unparalleled in Polymer Coatings and Adhesives Technology™*

## PRODUCT DATA SPECIFICATION



### MCT SD0802C

A High Performance

**Single Component, Refrigerated, High Thermal Conductivity, Very Low Resistivity**  
**Conductive Epoxy for Inter-Connecting Silicon Stacked Die Layers**

MicroCoat Technologies announces the arrival of their new low resistivity – high thermal conductivity die-stacking interconnect conductive adhesive MCT SD0802C. Many companies that are manufacturing stacked flash devices have gone to very fine line dispensed conductive adhesive instead of wirebonding to make the connections from layer to layer. MCT has developed a magnificent solution. It can be a dispensed bead or using high speed jet dispensing of conductive adhesive, the material can be applied at 50 microns wide with no sag or slump to 16+ flash layers (tested to date) with a 4 day room temperature working life. Besides the cost and space savings compared to wirebonding the conductive paths provide an ground-breaking method for helping to cool the device(s) with the high thermal conductivity of the epoxy acting as cooling fins. *It is shown that a 32MB 3D stacked DRAM cache can reduce the cycles per memory access of a twothreaded RMS benchmark on average by 13% and as much as 55% while increasing the peak temperature by a negligible 0.08°C. Off-die BW and power are also reduced by 66% on average. It is also shown that a 3D floorplan of a high performance microprocessor can simultaneously reduce power 15% and increase performance 15% with a small 14°C increase in peak temperature. Voltage scaling can reach neutral thermals with a simultaneous 34% power reduction and 8% performance improvement. Bryan Black, et al, Intel Corporation.*

This adhesive is a thixotropic silver filled conductive non-frozen adhesive capable of dispensed line widths of 50 microns. It is 100% solids, and posses' good handling and storage properties. This silver-filled conductive adhesive is designed to bond from IC to IC on Silicon with either gold or aluminum pads. It also bonds ICs and components to advanced substrates such as ceramic, PBGAs, CSPs and array packages with virtually no bleed. Hydrophobic and stable at high temperatures, the adhesive produces a void-free line with excellent interfacial adhesion strength. This material is formulated to provide high cohesive energy, adhesive strength, and elongation at break. Operating temperature range - 55°C – 225°C; Short term to 300°C.

#### Composition Properties

Filler Contents:	85% Silver
Viscosity:	Thixotropic 20-35 Kcps @ 10 RPM Brookfield HBT CP51 cone and plate.
Thixo Ratio at above viscosity parameters	~1.89 – 2.30
Average Particle Size:	.70 – 1.25 microns

#### Typical Cured Properties

Volume Resistivity:	.00015 - .00008mohms (Dispensed)
Thermal Conductivity	7.1-7.9 W/m-K
CTE Alpha 1 ppm/°C	50
CTE Alpha 2 ppm/°C	200
Tg°C	117
Die Shear psi	>8000
Shore "D" Hardness	75 - 80
Post Cure Ionics 883/5011.3.8.7	Cl=<6ppm, Na+=<3.3ppm, K+=<1.1ppm
Teflon Flask 5 gm sample using 20-40 mesh, 50 gm DI H <sub>2</sub> O, 100°C for 24 hours	

#### Modulus:

@65C = 5595 MPa, @25C = 5510 MPa, @150C = 925 MPa, @250C = 310 MPa

**Processing Procedures:** Mixing: The material should be lightly stirred prior to use if used from a jar. Not required if in a syringe

**Application:** The material may be applied by screen printing or syringe dispense

**Curing:** Cure at 150°C for 45 minutes. Optimum conditions will vary depending upon application and will need to be determined experimentally.

**Storage** MicroCoat SD0802C should be stored in sealed containers away from heat or flames. It has a shelf life of 4 days at a storage temperature of 25°C, 3 months at -10°C or 6 months at -40°C. Material **may** be returned to refrigerator/freezer after using partial syringes or jars.

**Packaging:** 3cc, and 10cc syringes **Shipped Unfrozen** next day delivery only

10242011

The information contained herein, is, to the best of our knowledge accurate. However, MicroCoat Technology does not assume any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of the suitability of any material is the sole responsibility of the user. The information contained herein is considered typical properties and is not intended to be used as specifications for our products. This information is offered solely to assist purchasers in selecting the appropriate products for purchaser's own testing. All products may be present in the form of a resin or a prepolymer. The user should use the proper precautions. Although certain hazards are described herein and in the Material Safety Data Sheets, we cannot guarantee that these are the only hazards that exist. Prolonged exposure to epoxy resins can cause sensitization or other allergic responses.

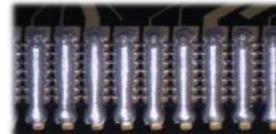
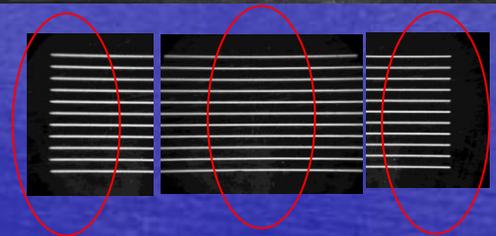
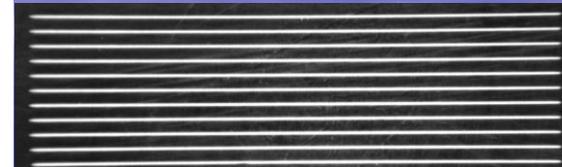
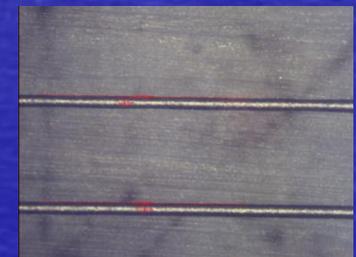


Photo Courtesy Vertical Circuits, Inc.





# SUPER HIGH TEMPERATURE CONDUCTIVE DIE ATTACH ADHESIVE TO $>650^{\circ}\text{C}$



- 85% Ag – NO ORGANICS
- NO Outgassing – NONE!, NADA!

Wirebonded Die

A795-VHT

Ni/Moly Tab

Eutectic Bond (Sn/Ge)

Au Pad

Substrate

FROM LAUNCH PAD

TO DOWN THE HOLE

**APPROVED FOR A HARD LANDING ON VENUS!!!!!!!**





## Product Data Sheet

### MCT A795-VHT

**APPROVED FOR A LANDING ON VENUS AT 450°C**

**An Electrically and Thermally Conductive, Silver Filled, Inorganic One-Part Adhesive for Use to >550°C**

**\*\*MAY NOT BE DIRECT BONDED TO GOLD**

- Low Cure Temperature
- \*\*Semiconductor Die Attach with Moly Tab for "Down the Hole Hybrids" or attach to Headers, Ag, Ni, Pd/Ag, Al, etc.
- Silicon die (no gold on back) to power headers
- Ceramic-to-Ceramic Heat Sink Bonding
- Substrate Attach to Nickel Plated Packages

Silver: 80% - 85% ~28 Micron

Viscosity: Thixotropic Paste

Pot Life: NA

**Recommended Cure: 2 Hours Room Temperature Followed by 2 hours at 120C.**

***For Vacuum Sealing Applications:*** ALL moisture is released between 300C-400C. After that there is absolutely no outgassing. Prior to final bake at temperature there are <.01ppm H2O moisture given off. It appears from lab testing that if you cure the product for an additional 2 hours at 150C (after 1-2 hours at 120C) this will eliminate any further moisture release

Temperature Resistance: 1200°F (649°C)

CTE, in/in/°F X 10<sup>-8</sup> (°C) 9.6 (17.3)

Thermal Conductivity,

Btu-in/hr-ft<sup>2</sup>-°F 63.1 (9.14 W/m-K)

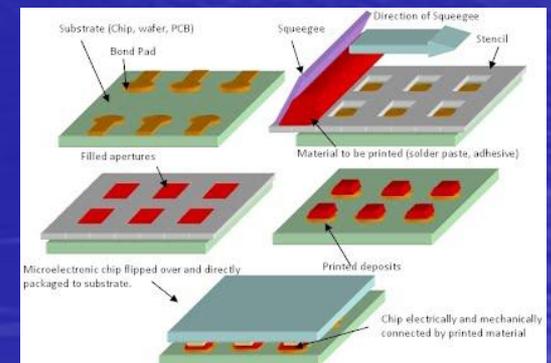
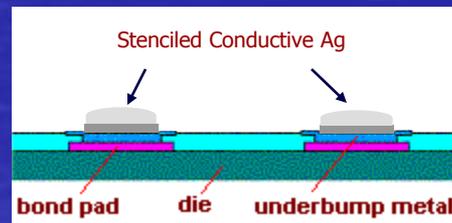
Volume Resistivity (ohms-cm) .0002

032406

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# Flip Chip Bumping Using Conductive Silver

- **Adhesive bumping** is a flip-chip bumping process that stencils electrically conductive adhesive over an under-bump metallization placed over the bond pad. The stenciled adhesive serves as the bump after it has been cured. Mounting of adhesive-bumped flip-chips also uses conductive adhesives.



# Thanks Very Much

Sam Forman President/CEO  
MicroCoat Technologies

## Questions?