

C5735 PRODUCT SNAPSHOT PORTFOLIO

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C5735-GOLD ETCHABLE AND PRINTABLE

Benefits and Features

Environmentally friendly – Pb free, Cd free, Reach and RoHS compliant





ENVIRONMENTALLY COMPLIANT

Development Product Information Sheet (DPIS*)

THICK FILM MATERIALS

Product Type: Conductors
Product Name: C 5735

Pb and Cd Free Gold Conductor

*DPIS-Typical Properties and Recommended Processing Guidelines subject to change

Description

C 5735 is a Pb, Ni and Cd free, gold conductor paste that has been formulated for use with Al or Au wire bonding applications. C5735 is a screen printable paste that gives an extremely dense and defect-free fired film. Fine lines are able to be screen printed down to 75 µm lines and spaces with etching possible for ultra-fine features down to 25 µm.

Key Benefits

- REACH¹ and ROHS² compliant
- Excellent Al and Au bondability
- High conductivity
- Fine line printing
- Etchable (Chemical and Laser)

Typical Properties

Resistivity
≤ 4.5 mΩ/□
at 10 µm fired film thickness using 25 mil wide serpentine conductor pattern

Viscosity
400 – 500 Kcps Brookfield HBT
DV-III #14 spindle in utility cup 10 rpm, 25 °C

Al Wire Bondability
1.25 mil Wire
96 % Al₂O₃ & IP9217
Initial: >10g

Au Wire Bondability
1.25 mil Wire
96 % Al₂O₃ & IP9217
Initial: >12g

Solids
84.5% ± 1

Recommended Processing Guidelines

Printing
325 – 400 mesh stainless steel screen
0.3 – 0.5 mil emulsion
1.1 mil wire

Settling:
A settling time of 10 – 15 minutes is recommended. Parts should be dried as soon as possible after the setting period, (within 20 minutes), so the paste does not skin over. Parts should not be left out for long periods of time before drying. This allows the paste to skin over and can compromise adhesion. Wet parts should be covered if not dried right away.

Drying
150 °C for 10 minutes
Make sure ventilation is sufficient to prevent the wet film from skinning

Firing
850 °C peak temperature, 10 minutes at peak
Total cycle time of 45 – 60 minutes

Thickness
Wet: 28-34 µm
Fired: 6 – 10 µm

Thinner
RV-507

Warranty
TBD

Storage
Store in a dry location at 20 °C – 25 °C.
DO NOT REFRIGERATE.
Allow paste to come to room temperature prior to opening.
Spatulate well before using, as settling may occur during storage.

Lead-Free

Cadmium-Free

Thalate-Free

REACH
compliant

RoHS
compliant

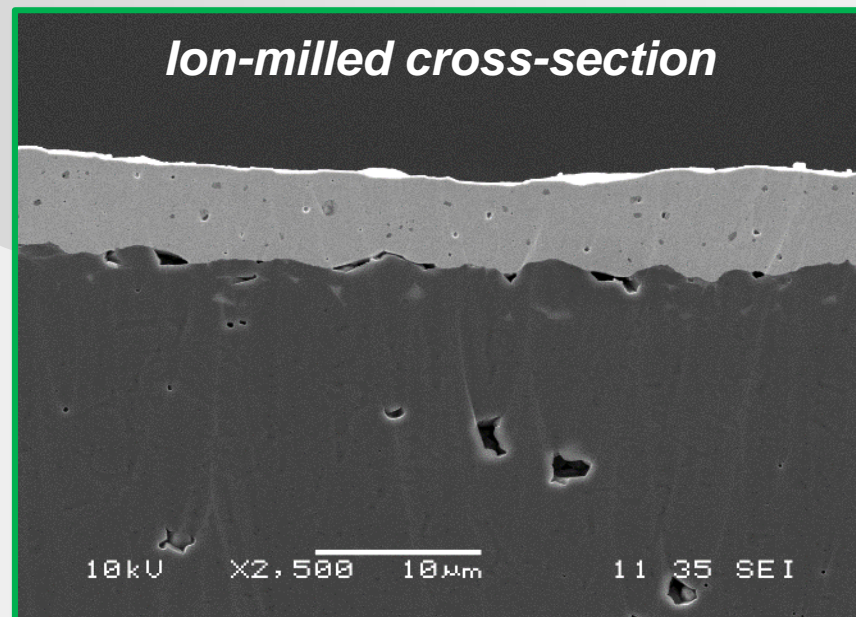




PROCESSING

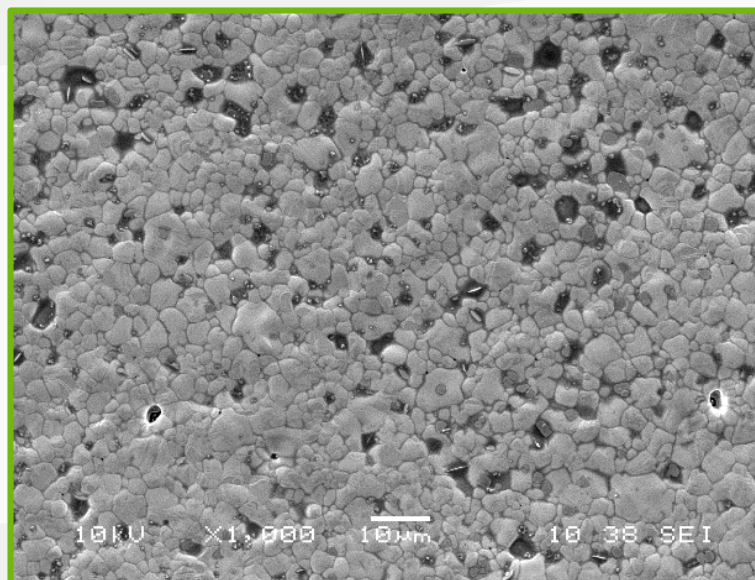
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Ion-milled cross-section



As seen from the cross-section above, C5735s displays an extremely uniform and dense film. As seen from the top down images to the right, This high density makes this material set attractive in high reliability application settings.

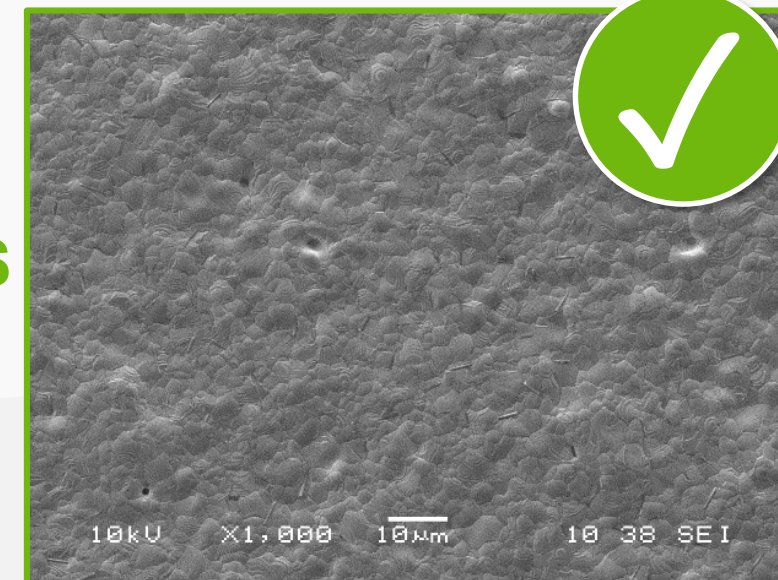
Top-down SEM example of Au conductor with low density, highly porous



High R_a

VS

Top-down SEM example of C5735s' high density smooth surface



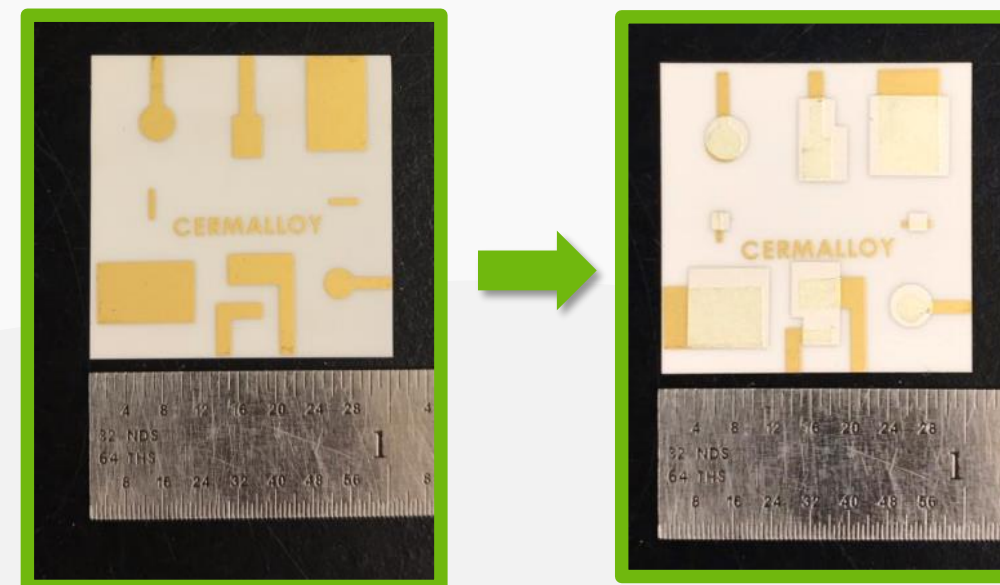
Low R_a

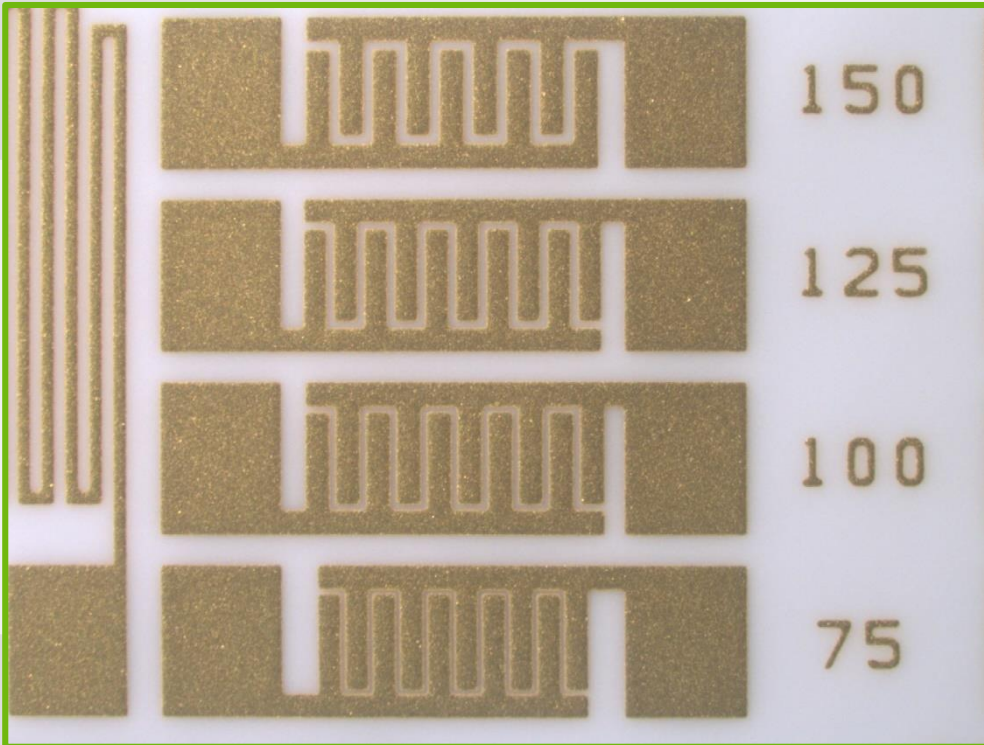
COMPATIBILITY

Part Number	Material Type
IP9036A	Resistor Overglaze
IP9217	Multilayer Dielectric
C2160B	6:1 Ag/Pd paste
C2130B	3:1 Ag/Pd paste
R8900	Resistor Series 10 Ω/\square – 1M Ω/\square
R9000	Resistor Series 0.1 Ω/\square – 20G Ω/\square
C3620	Pt conductor ink

Further testing is being completed to determine the compatibility between C5735 and other Heraeus Pb-free materials.

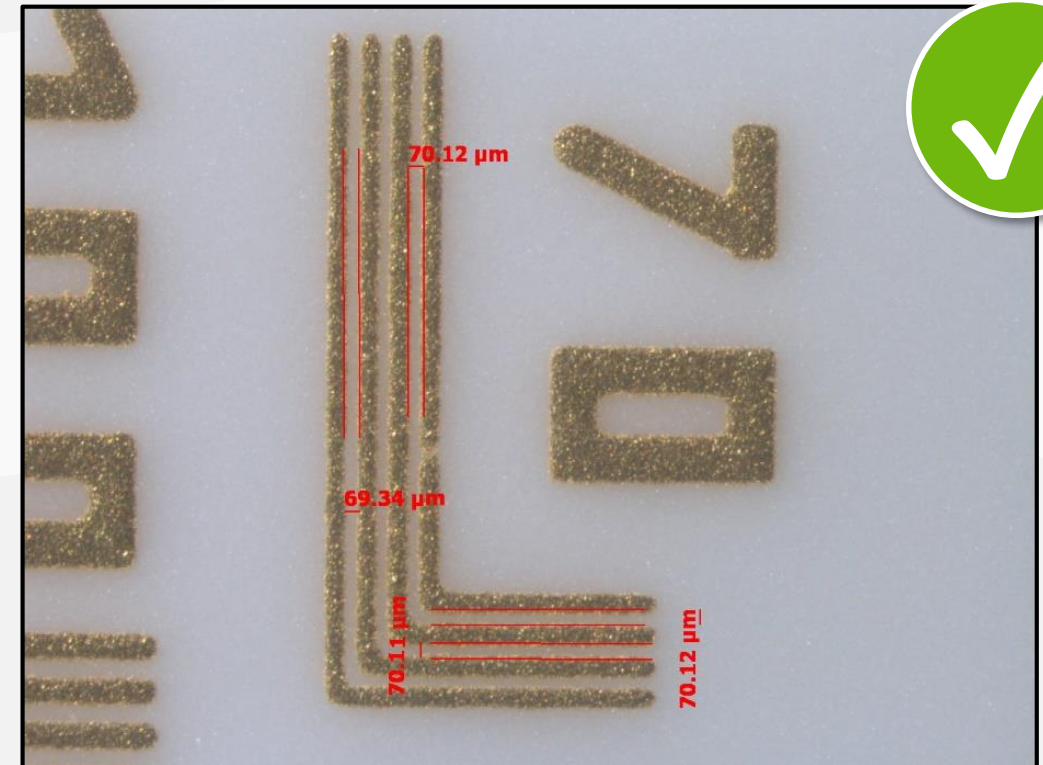
C5735 has been tested with various Heraeus Pb-free materials to ensure compatibility for high-reliability hybrid applications.





The rheology of C5735 has been carefully optimized to maintain excellent printability and fine line resolution. C5735 prints less than 3 mil lines and spaces with ease.

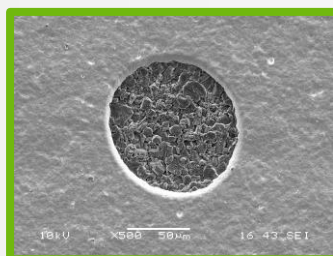
Example of C5735
Excellent fine line resolution



70 μm Printed Lines

ETCHABILITY

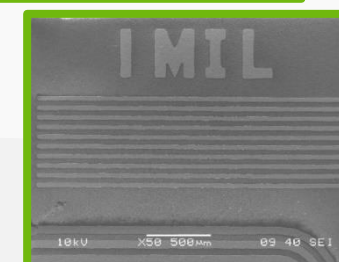
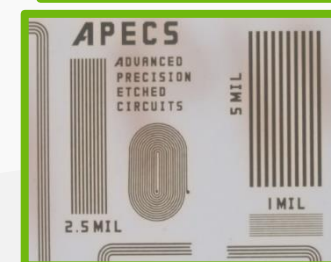
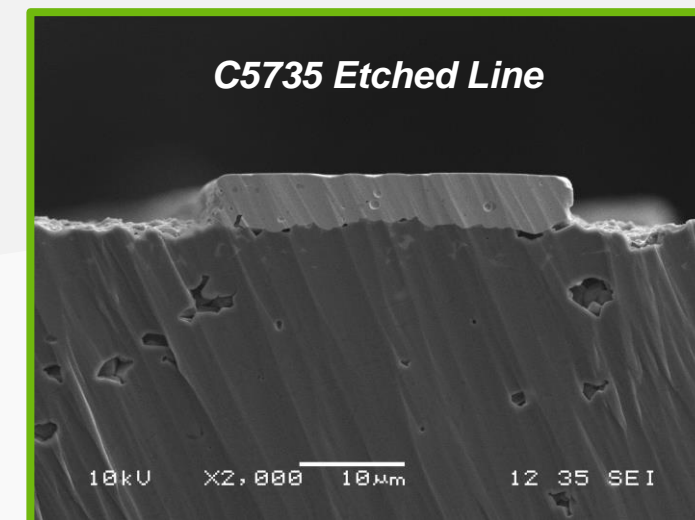
LASER



C5735 has a unique chemistry to not only be etched in the traditional chemical process, but also be laser ablated to provide unique dense circuitry with a faster throughput process.

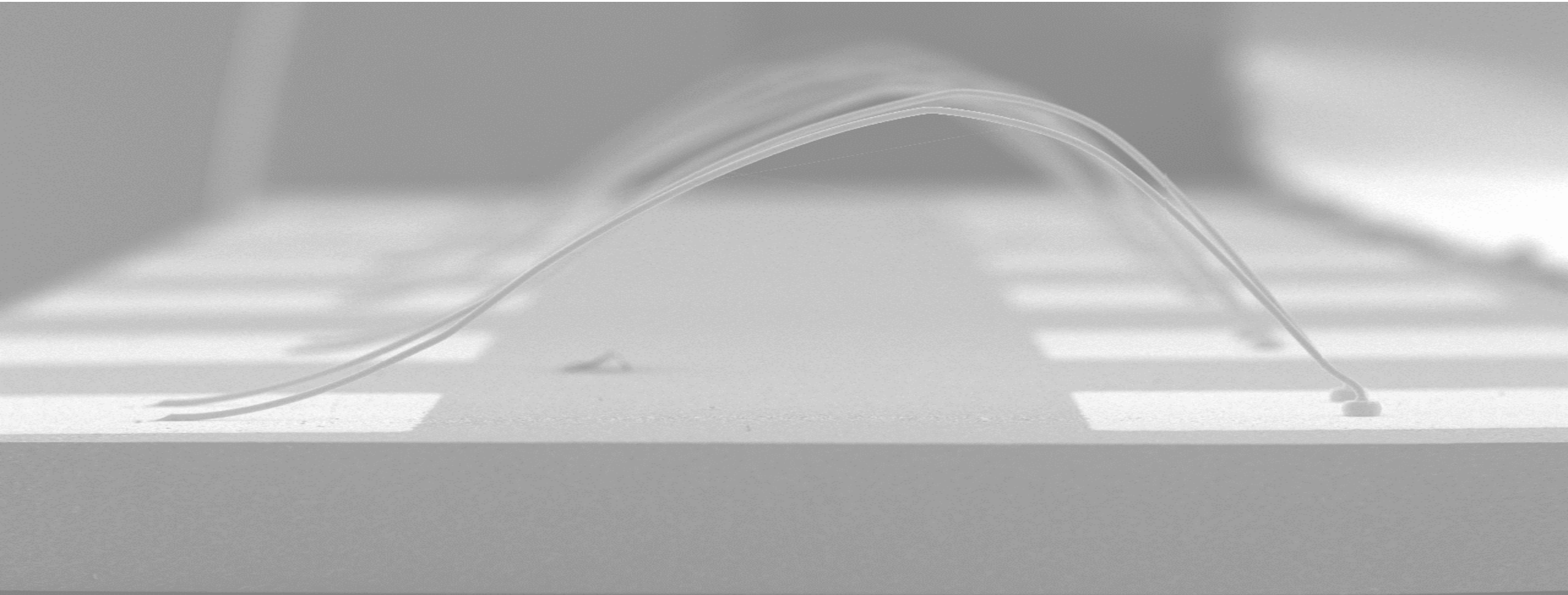
Post laser ablation, **C5735** displays excellent wire bond adhesion with acceptable failure modes on both fired-lasered and dry-lasered parts. Parts that are dry-lasered are then post-fired to sinter the Au film. Laser ablation has been successful on C5735 with both an ESI Lodestone which is a green laser (515 nm) and an ESI Redstone UV laser (343 nm). All laser ablation results are compared to a control during testing, which is the traditional chemical etch process.

CHEMICAL



C5735 reliably and quickly etches down to 1 mil lines and spaces making processing much easier and increasing throughput. It can be seen from the above image that C5735 etches down with no undercutting which provides a uniform, dense film. This is very useful in high reliability environments where high density circuitry is required.

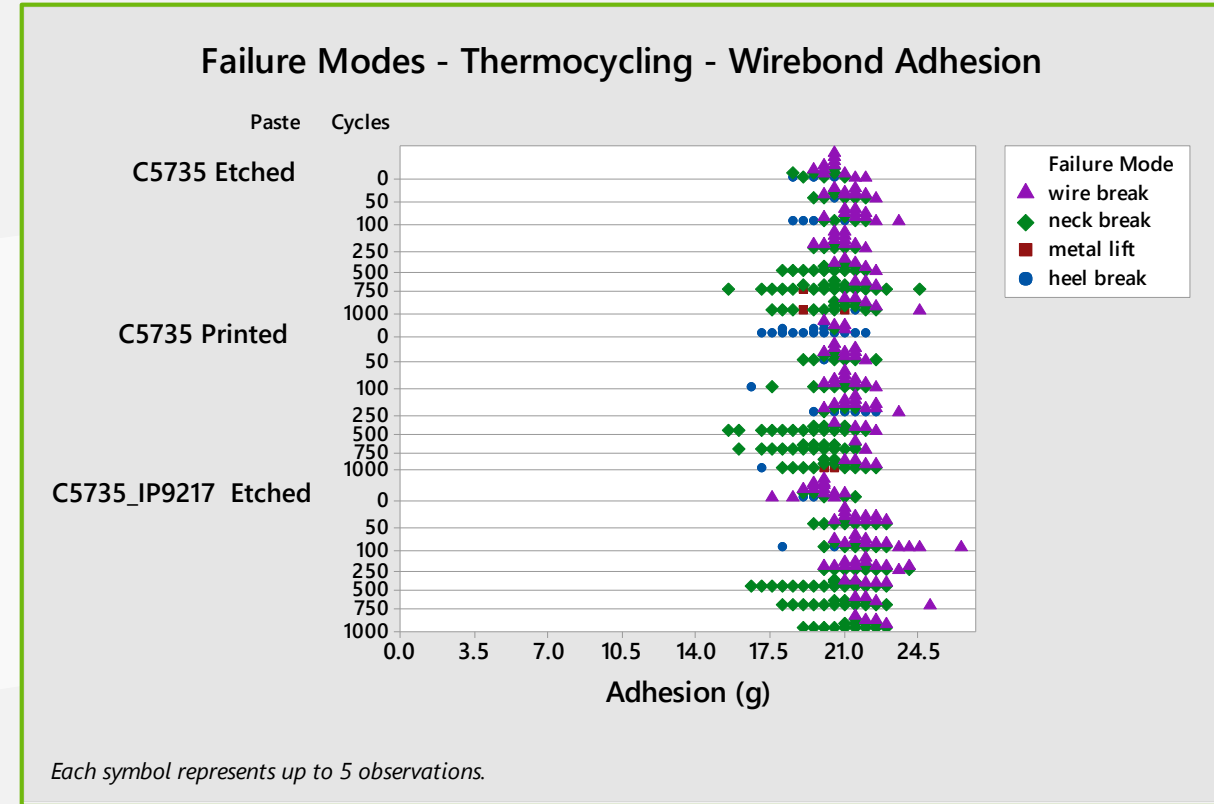
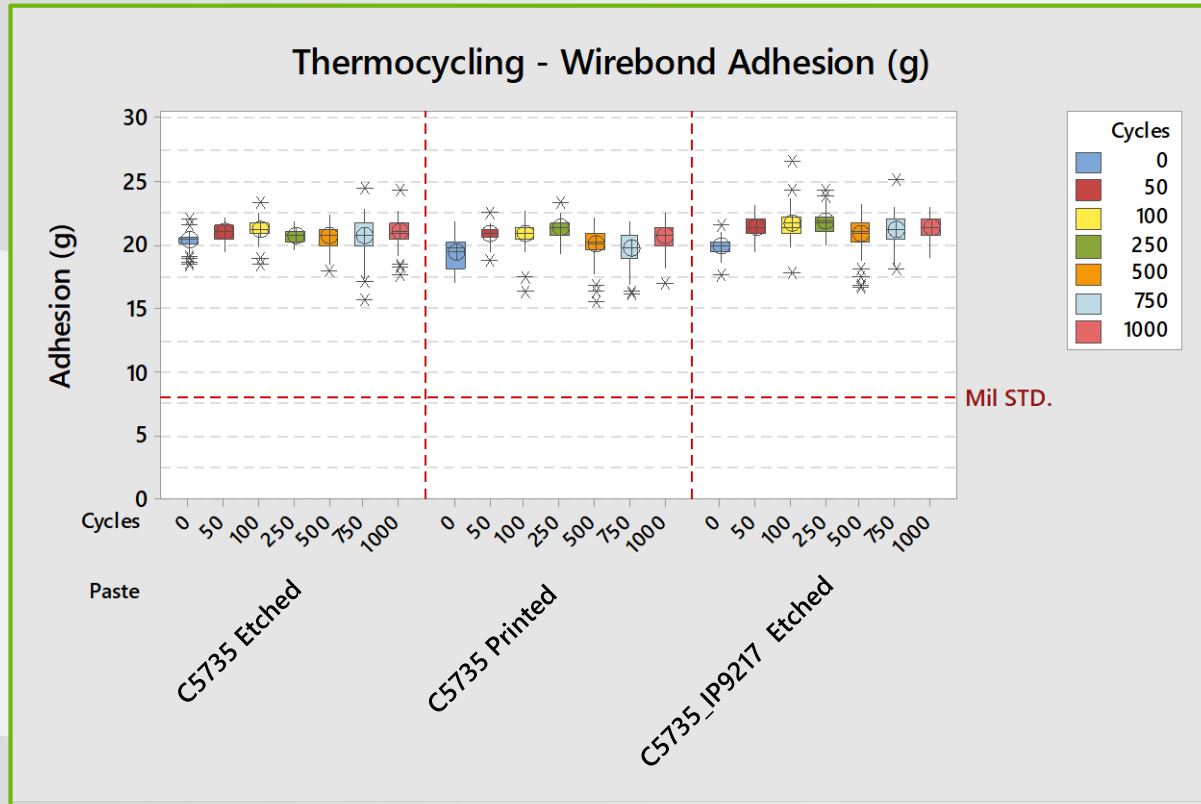
The top images show **C5735** etched down to 5, 2.5, and 1 mil lines and spaces on Heraeus Pb-free dielectric Al_2O_3 (left) and 1 mil etched lines (right). The bottom image is an S.E.M. image of **C5735** etched down to 1 mil lines and spaces on Al_2O_3 . Heraeus would like to thank Anaren for the above images as it was etched at their facility.



RELIABILITY DATA

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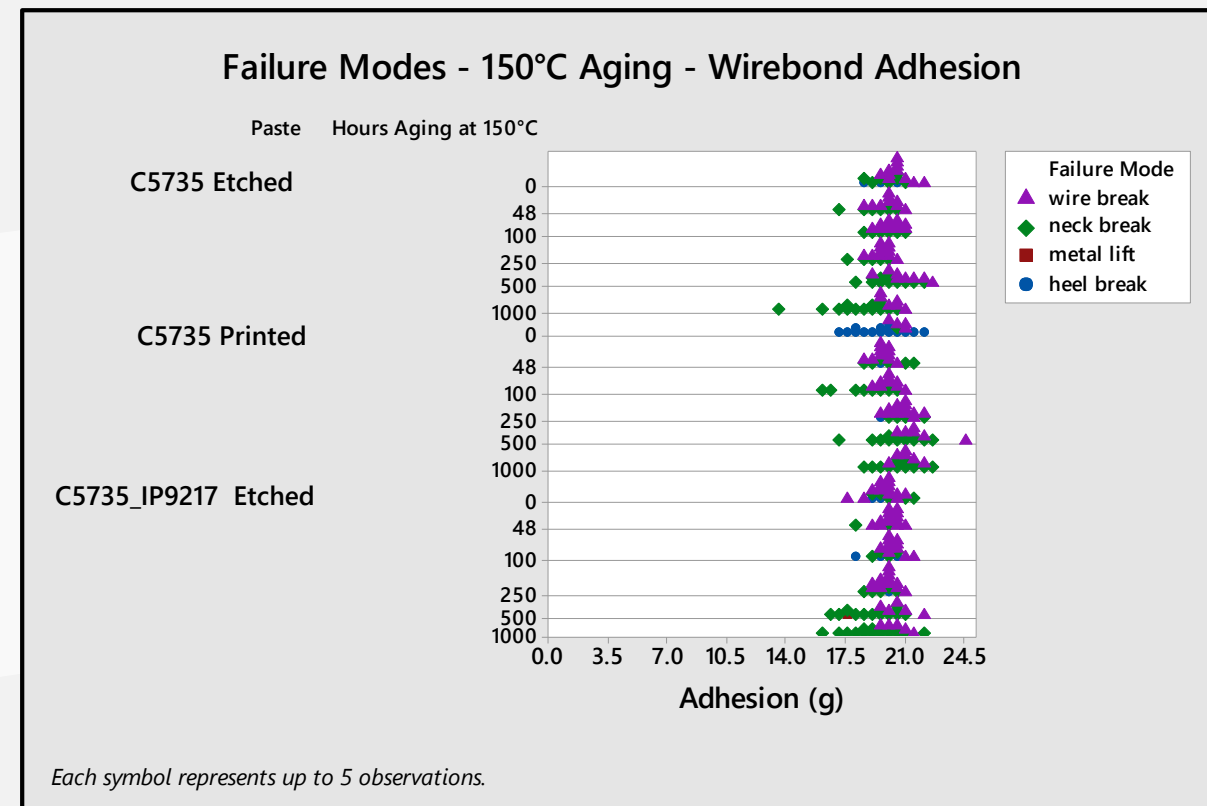
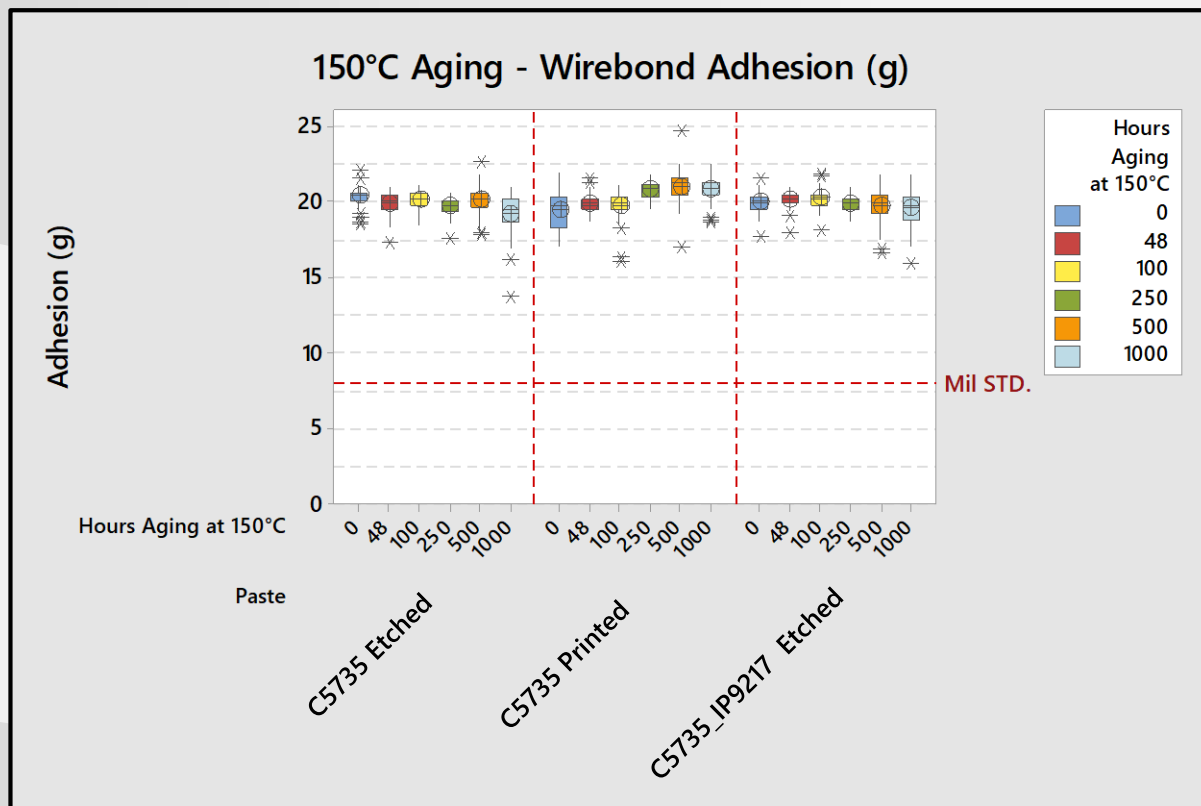
Wire Type: 1.25 mil Au
Substrate: 96% Al₂O₃



The thermocycling data shows wirebond adhesion in grams (left) and failure mode (right) initially and after 50, 100, 250, 500, and 1,000 cycles from -55°C – 150°C. The data shows when etched on Al₂O₃, printed on Al₂O₃, and etched on dielectric IP9217, C5735 shows excellent wirebond strength up to 1,000 cycles with acceptable failure modes.

150°C AGING DATA

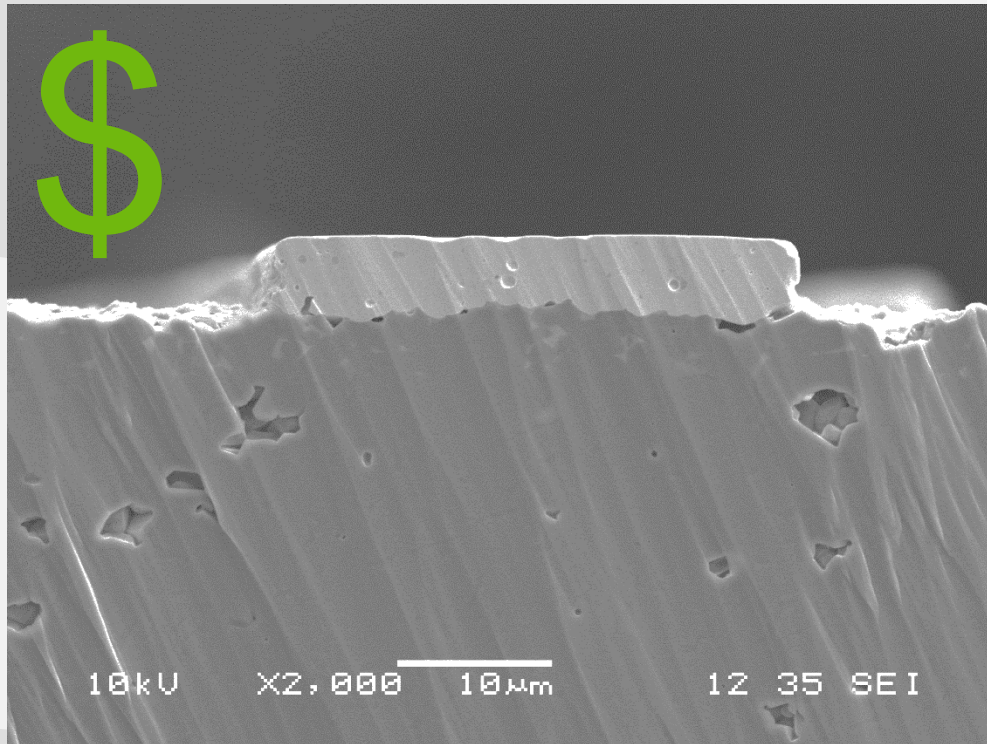
Wire Type: 1.25 mil Au
Substrate: 96% Al₂O₃



The above data shows the wirebond adhesion (left) and failure modes (right) of C5735 after 0, 48, 250, 500, and 1,000 hours aged at 150°C. The data shows excellent wirebond adhesion with acceptable failure modes of C5735 etched on 96% Al₂O₃, C5735 printed on Al₂O₃, and C5735 etched on Heraeus Pb-free dielectric IP9217 even after 1,000 hours aged at 150°C.

COST COMPETITIVE

C5735 maintains excellent performance with less material.



C5735 has a competitive cost advantage compared to other thick film suppliers standard thick film gold conductors as customers can utilize less material in their circuits and maintain excellent adhesion, etching performance, and density.

THANK YOU!

YOUR HERAEUS ELECTRONICS

Enabling you for future devices

