

Reliability of the cohesiveness of diverse connection technologies

J. Karlsson
S. El Nadeim

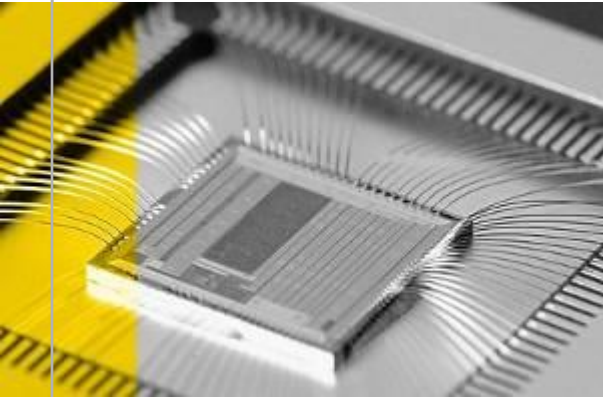
What will be talked about...

- Microdul AG
- Assembly Techniques - Introduction
- Conductive gluing vs. soldering
 - Adherence of different termination materials (conductive gluing)
- Influence of aging (life tests) on reliability of connection joints

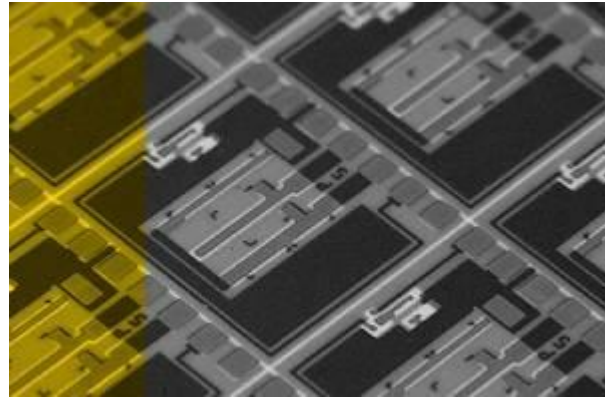
Microdul AG

Business areas

Module

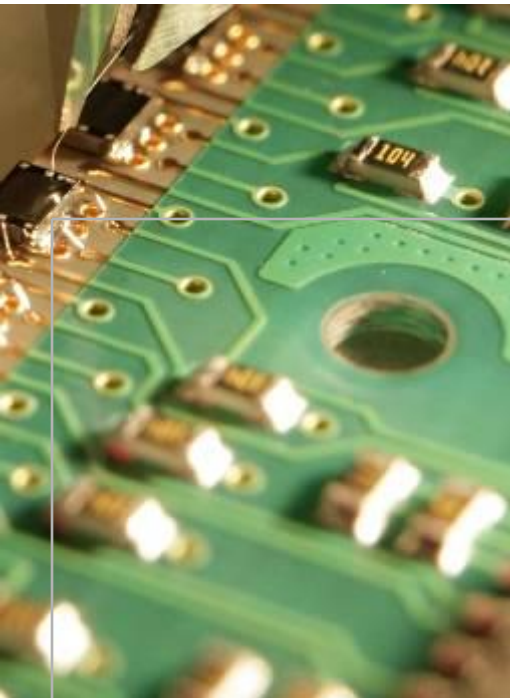


Thick film



Semiconductors





Our competencies

Miniaturisation of micro electronics

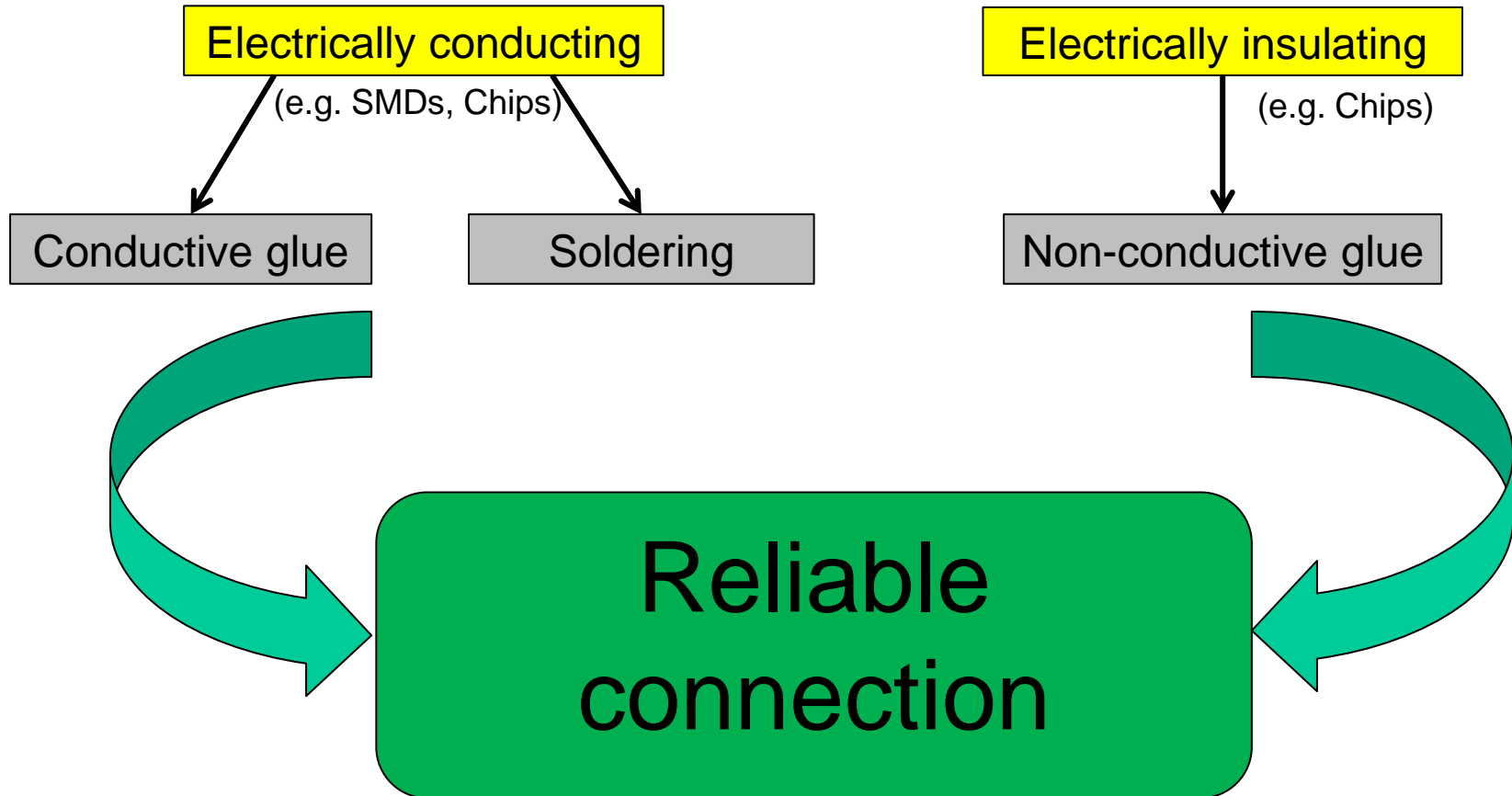
Supplier of turnkey solutions from prototype development to mass production

Quality certifications:

- ISO 9001: 2008
- ISO 13485: 2003 (medical products)

Assembly Techniques

Introduction – assembly techniques



Introduction – assembly techniques

- **Reliable...what does it mean?**
 - Fulfillment of all requirements
 - Operating temperature/environment taken into consideration
 - Environment protection
 - Biocompatibility
 - ...

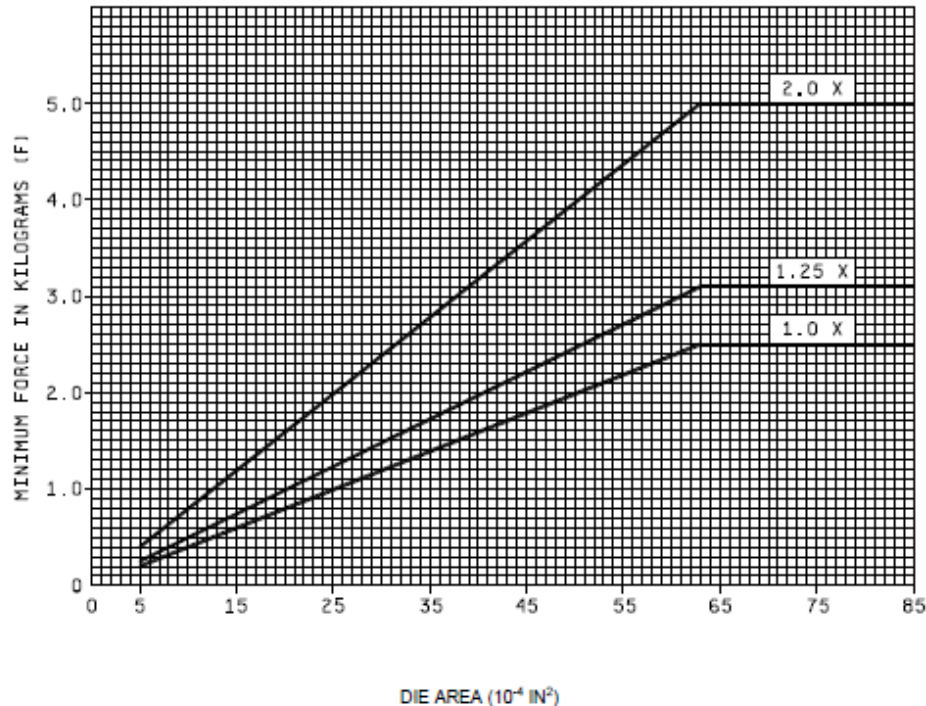
Conductive Gluing vs. Soldering

Conductive Gluing vs. Soldering

- All shear tests according to MIL-STD-883H
- Comparison of...
 - AgPd soldered & glued
 - Sn soldered
 - Si glued
 - Au glued... on the same substrate
- Shear strength spread
- Different bonding areas

MIL-STD-883H

- Few facts about this norm:
 - Department of Defense (USA)
 - Test Method Standard – Microcircuits
 - Method 2019.8

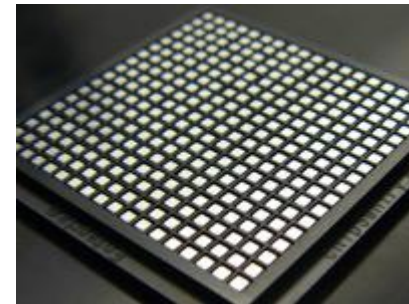


Conductive Gluing vs. Soldering

So what did we actually test...



SMD



Diodes (bare die)

Conductive Gluing vs. Soldering

- Shear strength depending on assembly technique

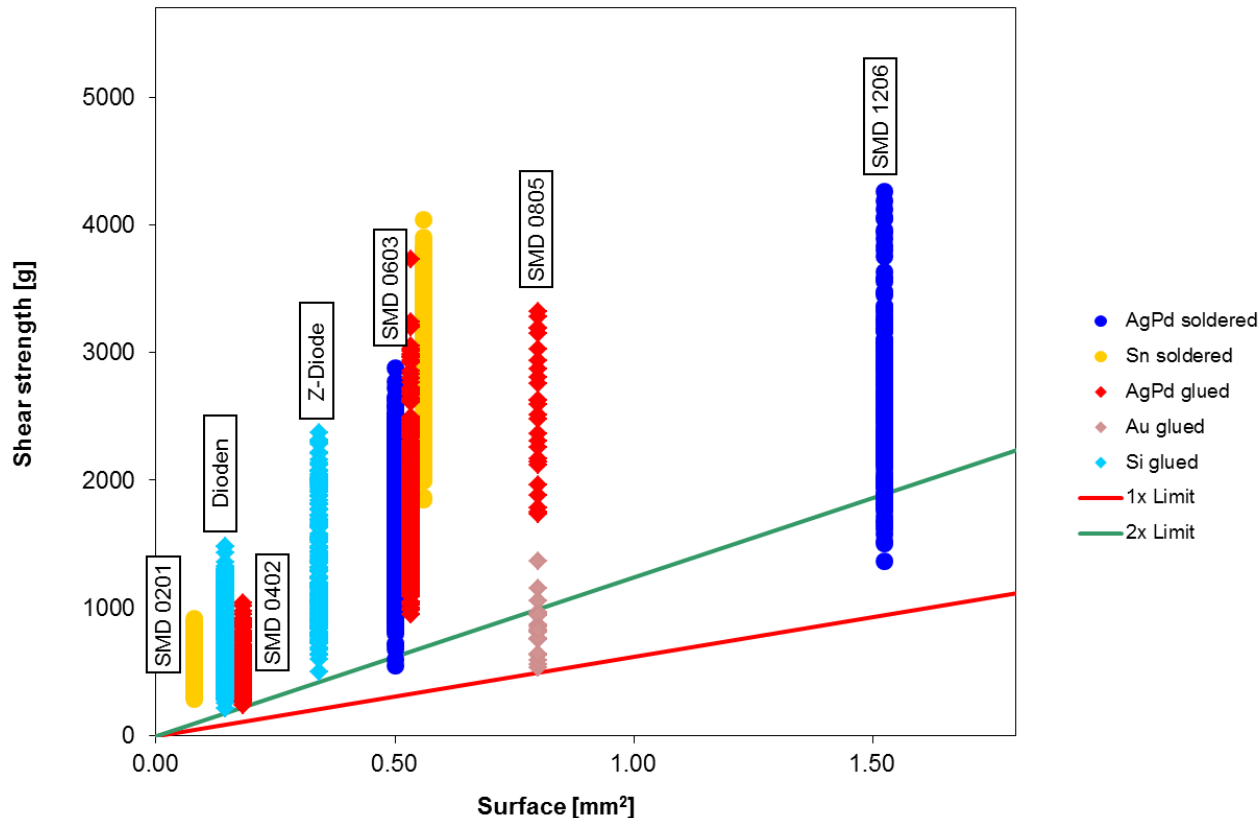
Surface:

1) SMD:

- 0201 – 0.08 mm²
- 0402 – 0.18 mm²
- 0603 – 0.53 mm²
- 0805 – 0.80 mm²
- 1206 – 1.52 mm²

2) Chips:

- 0.15 mm²
- 0.34 mm²



Conductive Gluing

- Shear strength depending on assembly technique

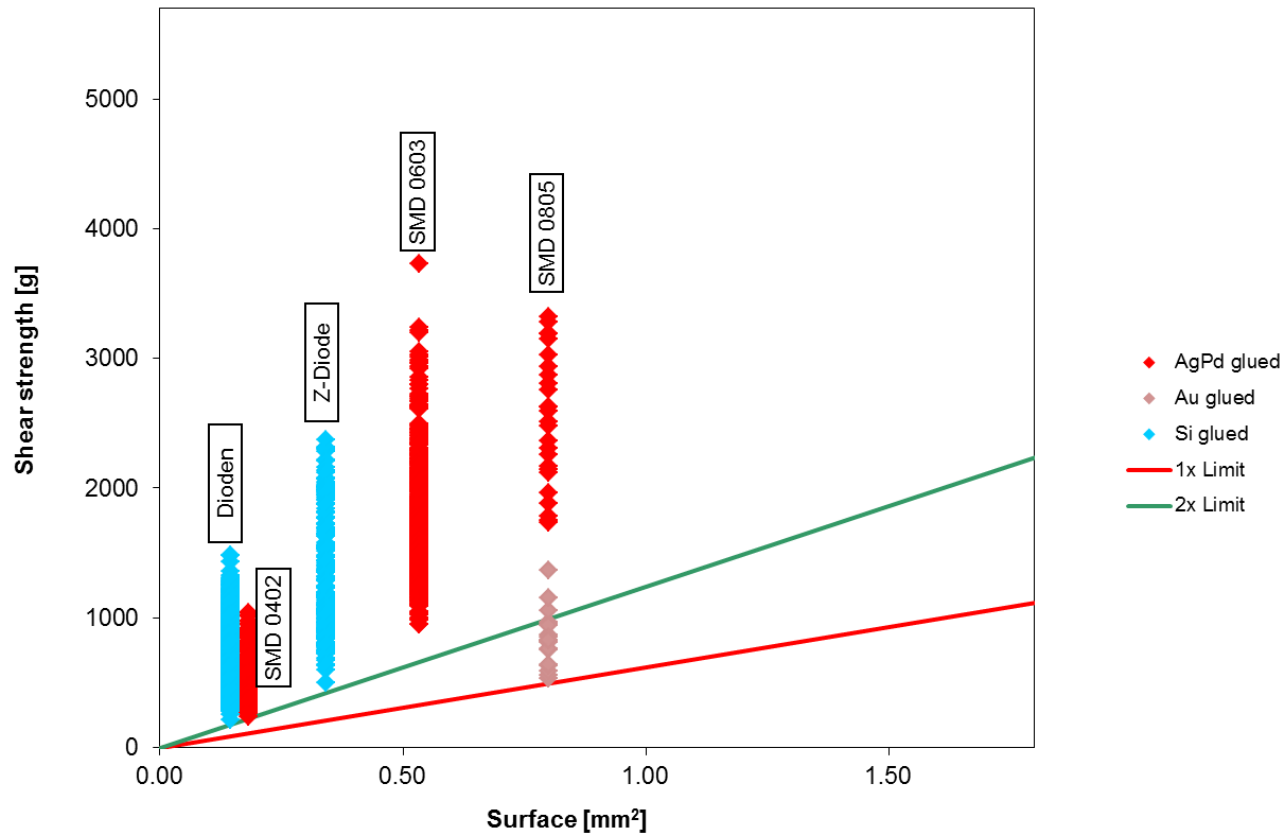
Surface:

1) SMD:

- 0201 – 0.08 mm²
- 0402 – 0.18 mm²
- 0603 – 0.53 mm²
- 0805 – 0.80 mm²
- 1206 – 1.52 mm²

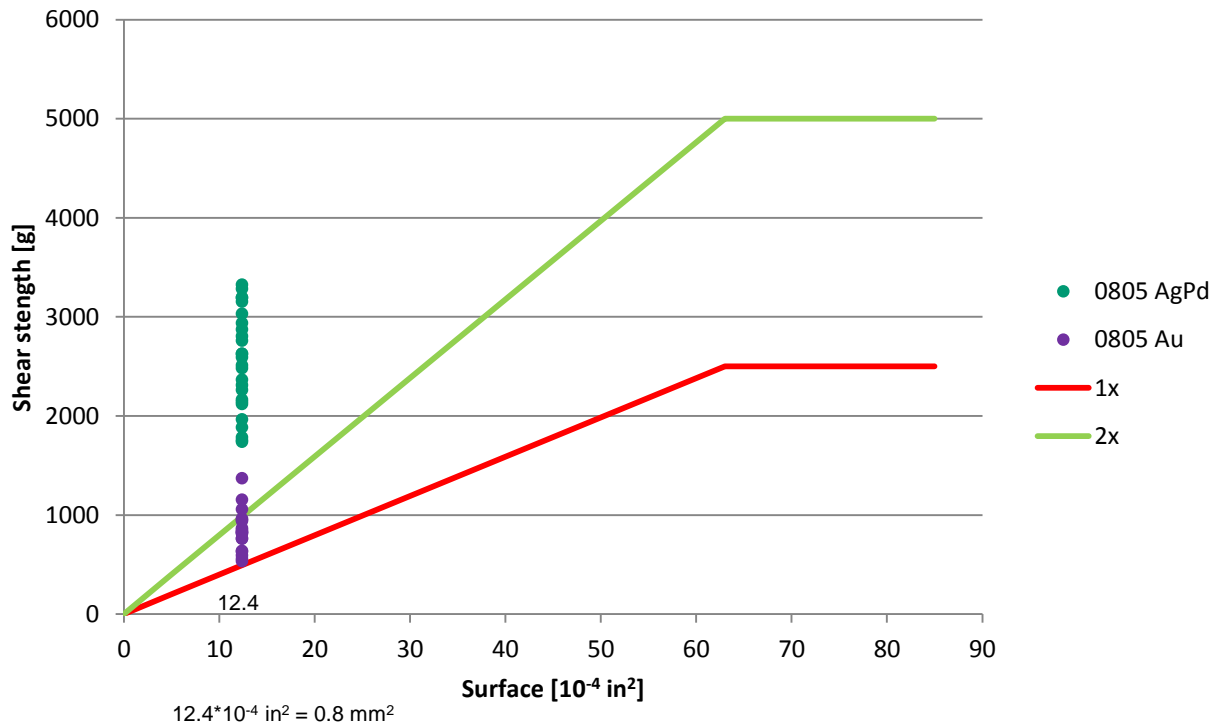
2) Chips:

- 0.15 mm²
- 0.34 mm²



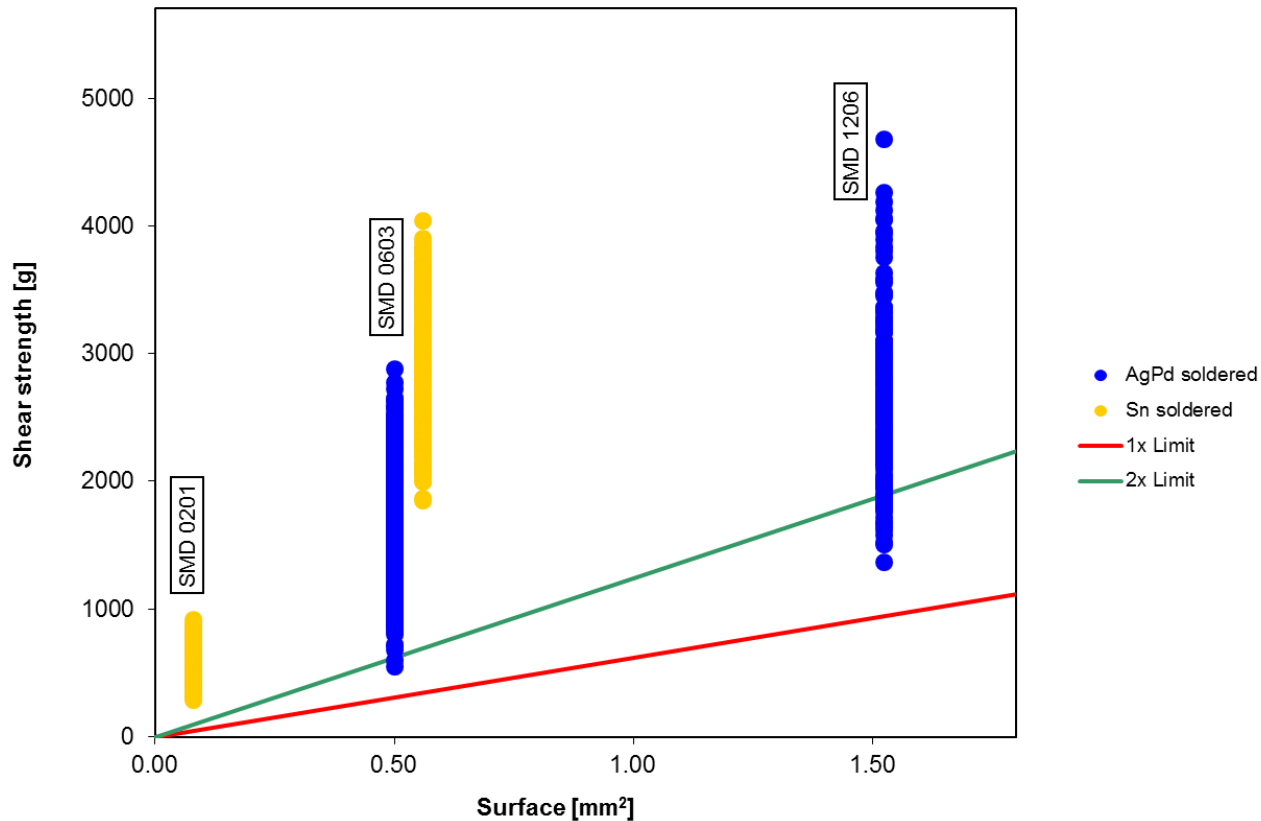
Conductive Gluing – Components with different metallization

- It is known that some materials are more suitable for conductive gluing while others – for soldering. A comparison of shear strength of glued SMDs with AgPd and Au connectors.



Soldering

- Shear strength depending on assembly technique



Surface:

1) SMD:

- 0201 – 0.08 mm²
- 0402 – 0.18 mm²
- 0603 – 0.53 mm²
- 0805 – 0.80 mm²
- 1206 – 1.52 mm²

2) Chips:

- 0.15 mm²
- 0.34 mm²

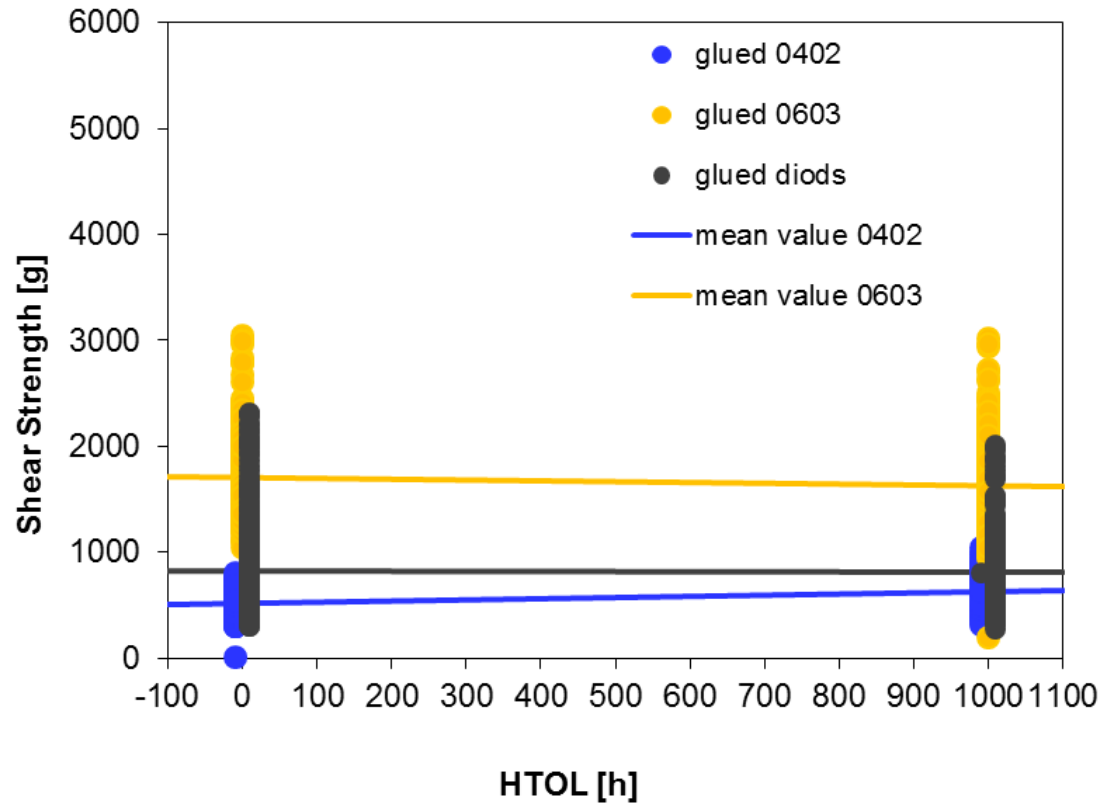
Conductive Gluing vs. Soldering - Summary

- Larger bonding area means stronger bond
- Larger bonding area tends to cause wider bond strength spread
- Soldering generally better than gluing
- Termination material aspect has an influence

Gluing & Aging

Gluing & Aging

- Aging effect (accelerated lifetime test)



Gluing & Aging - Summary

- No considerable influence within tested life span

Thanks for your attention

Any questions?