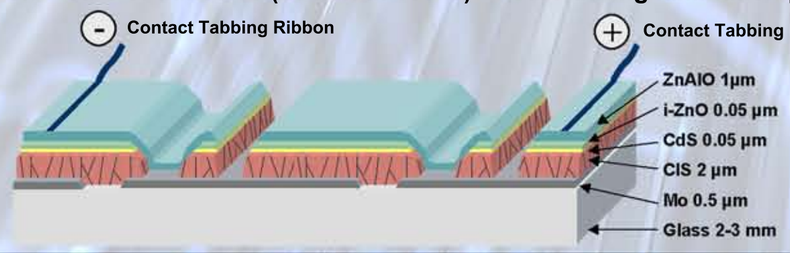
Electrically Conductive Adhesive Reliability in Thin Film Photovoltaic Modules

Thin Film Solar Modules - Back End

- Thin Film Solar Cells require conductive adhesives to eliminate stress of fragile substrates during electrical interconnection
- Bonding of Sn or SnAg coated Cu tab to the front contact (TCO) with conductive adhesive (CE 3103 WLV)
- Placement of EVA foil and glass
- EVA lamination + cure of adhesive (15 min at 150°C) → cure during lamination process



Electrically Conductive Adhesive CE 3103 WLV

Adhesive Advantages:

- CE 3103 WLV is a fast cure electrically conductive adhesive
- Excellent and stable contact resistance
  - Under thermocycling and humidity testing
- Good mechanical strength on non-Ag bearing tabbing ribbons
  - Can replace solders, conductive tapes and ultrasonic welding for electrical interconnection of thin film solar cells
- Co-curable during standard EVA lamination process (+/- 20 minutes @ 150°C)
- Application method: needle-dispensing

* Electrically Conductive Adhesives tested under the requirements of Thin Film Solar Interconnects

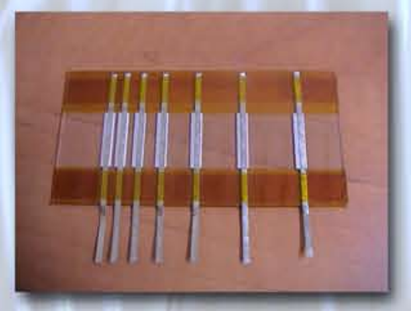
CE 3103 WLV Reliabilility Testing

Contact Resistance Measurements Sn tabs on ITO

Test method on ITO: TLM

Contacting area = 40 mm² (2 x 20 mm²)

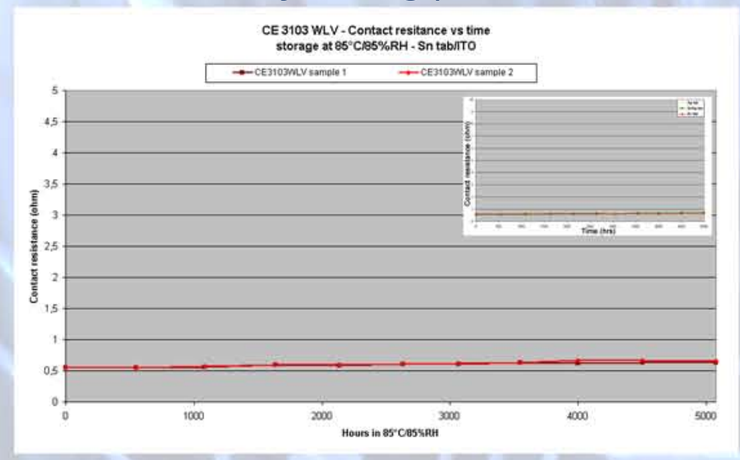
Material is stencil printed on ITO substrate with 100 micron thick stencil



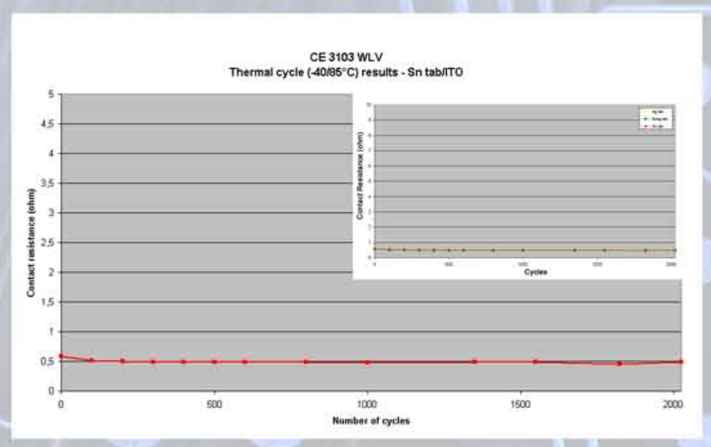
- Resistance measured at increasing distances
- Resistance plotted vs distance
- Rc determined from intercept

* TLM Test Method for Contact Resistance Reliability Measurements

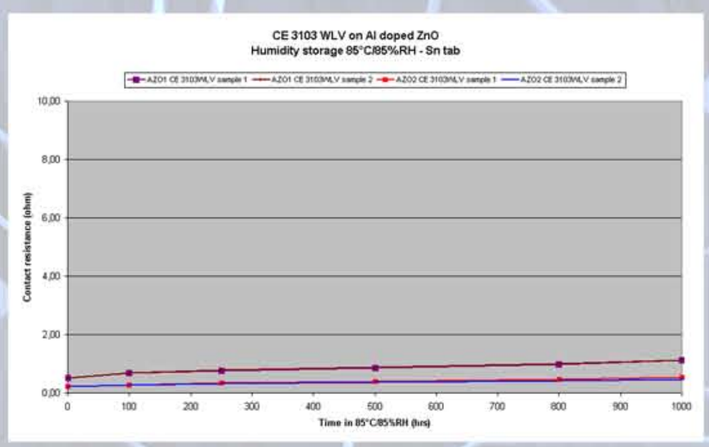
CE 3103 WLV Reliability Testing (85°C/85%RH, Sn-ITO)



CE 3103 WLV Reliability Testing (TC -40°C/+85°C, Sn-ITO)



CE 3103 WLV Reliability Testing Sn – Al:ZnO on glass



CE 3103 WLV Flexibilized

	CE 3103 WLV	XCE 80239
Description	Semi Rigid	Semi Flexible
Viscosity (Pa s)	20	40
Cure time 150°C (min)	5	5
Volume resistivity (Ohm cm)	1 10^{-3}	1 10^{-3}
E-modulus (MPa)	5500	1700
TLSS (Al/Al)	10.5	10.4

XCE 80239

Improve bend test performance of CE 3103 WLV modifications with similar reliability for use of flexible metal substrates

Conclusions

- CE 3103 WLV is a fast cure electrically conductive adhesive, 5 min. @ 150°C
- Recommended product for thin film solar assemblies with “Semi-flexible / rigid” substrates
- Excellent contact resistance stability under thermocycling and humidity testing
- CE 3103 WLV outperforms solder regarding cure temperature, flexibility and contact resistance stability
- CE 3103 WLV outperforms ultrasonic welding with regards to process yield and investment requirements; no additional Al deposition required
- If extreme flexibility is required, XCE 80239 may be considered
- Recommended product for **Thin Film Solar Modules**

* Electrically Conductive Adhesives meet the requirements of Thin Film Solar Interconnects

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