

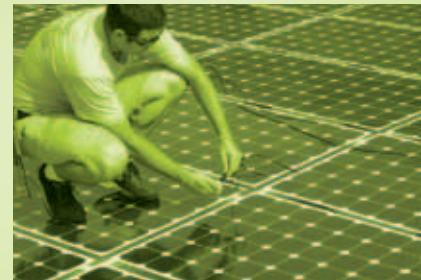
Acheson

Hysol

LOCTITE

Multicore

Electronic Solutions for the Photovoltaic Industry

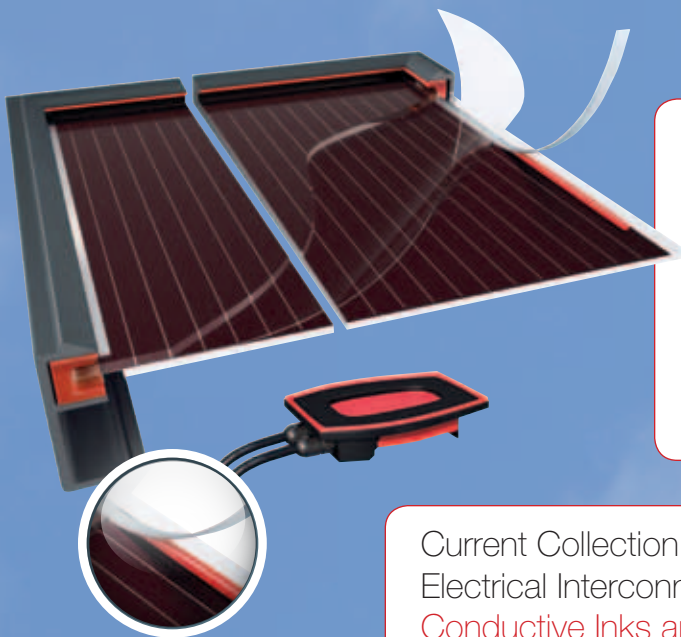
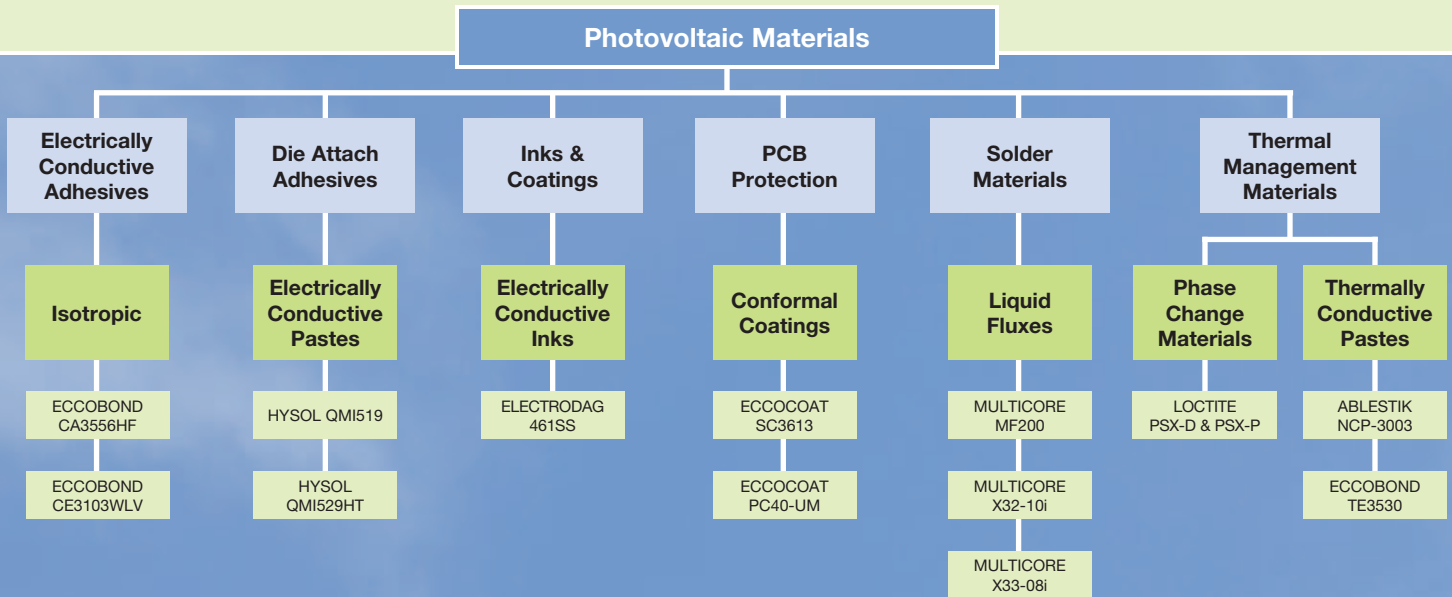


Henkel



PHOTOVOLTAIC APPLICATIONS (SOLAR)

Henkel manufactures numerous assembly and protection materials for the demanding requirements of photovoltaic electronics. Whether your solar cells and modules are based on silicon, thin film, concentrator, dye sensitized, or organic technology, Henkel materials enable a robust assembly, providing the performance and reliability required. Our portfolio consists of thermally conductive materials, electrically conductive adhesives and inks, as well as fluxes, solders, encapsulation materials, dielectric adhesives, and sealants for assembly of photovoltaic modules.



THIN FILM PHOTOVOLTAIC

Metal Tab Bonding

Electrically Conductive Adhesives

- Long-term reliability – stable contact resistance even on non-noble metals
- One-component pre-mixed material, ready to use
- Materials with cure profiles matched to EVA / PVB curing; no added cure steps needed
- Fast cure materials, enabling high volume, high throughput

Current Collection and Electrical Interconnection

Conductive Inks and Coatings

- Very flexible, fast drying electrically conductive, printable ink
- Unique low sheet resistance, suitable for flexible solar modules
- Long screen residence time
- Printable and excellent adhesion on various conductive transparent oxides, such as ITO, AZO



CRYSTALLINE SILICON PHOTOVOLTAIC: STANDARD H PATTERN AND BACK CONTACT



Metal Tab Electrical Bonding Electrically Conductive Adhesives

- Reliable electrical interconnects with long-term stable contact resistance
- Very good peel strength
- One component premixed materials ready to use
- Fast cure materials, enabling high throughput production processes
- Lead-free (Pb-free) materials
- Low temperature curing (<150 °C), resulting in less stress during the production process
- Flexible materials provide low stress, enabling thinner silicon and higher yields



Metal Tab Bonding Liquid Fluxes

- Low residue, no clean materials
- Spray or Dip application
- Wide process window enabling faster solder processing

CONCENTRATOR PHOTOVOLTAIC (CPV)

CPV Die Attach to Lead Frame Die Attach Adhesives

- Electrically and thermally conductive die attach adhesives (1)

Lens Fixation

Non-conductive Adhesives

- Fast cure, low temperature cure adhesive for lens fixation (2)

Thermal Management

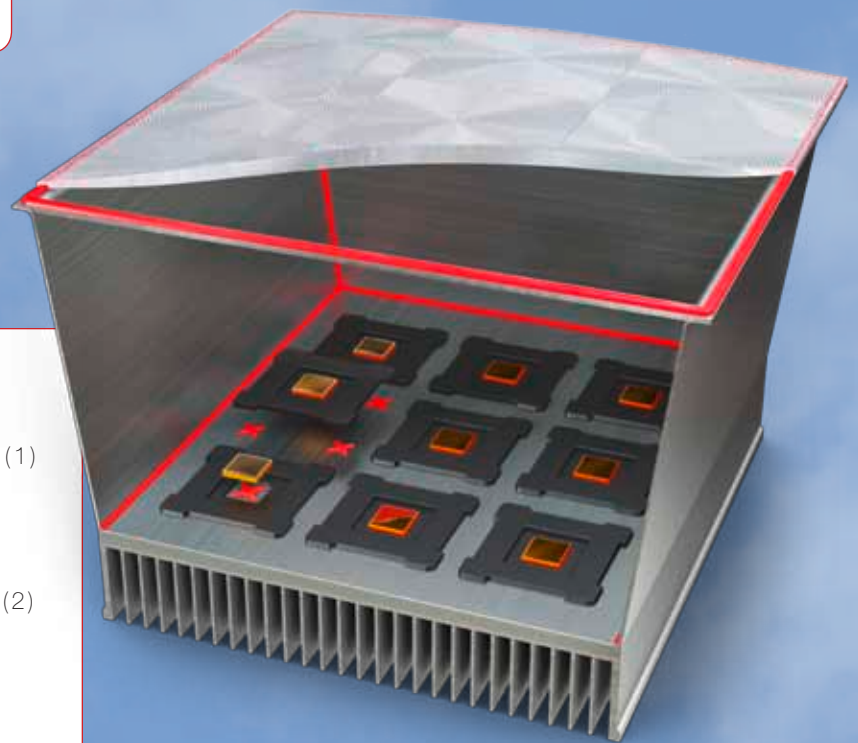
Thermally Conductive Adhesives

- Thermally conductive adhesive pastes, films, pads and phase change materials for heat dissipation (3)

CPV Die Encapsulation

Die Encapsulants

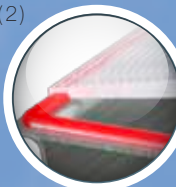
- Low-stress, transparent encapsulants (4)



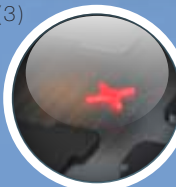
(1)



(2)



(3)



(4)



Electrically Conductive Adhesives - Isotropic

Product	Description	PV Application	Cure Type	Cure Schedules	Viscosity (cPs)	Volume Resistivity (OHM.CM)	Shelf Life	Pot Life
ECCOBOND CA3556HF	One-component, highly flexible, conductive adhesive for applications with large CTE mismatches between substrates. For use in Thin Film PV assemblies or crystalline Silicon Cell assemblies where rapid curing and good peel strength on metal current collectors are needed.	Thin Film, Crystalline Silicon	Heat Cure	Cures < 10 sec. @ 150°C	28,000 - 35,000	0.0025	6 months @ -18°C	2 days
ECCOBOND CE3103WLV	Electrically conductive adhesive for Thin Film PV assemblies with superior contact resistance stability. A lead-free (Pb-free) alternative to solder. Low viscosity for fine line dispensing. This product is compatible with SnPb, SnAg and Sn terminated current collectors, and curable during the EVA lamination process.	Thin Film, Crystalline Silicon	Heat Cure	3 min. @ 150°C	15,000 - 25,000	0.0008	12 months @ -40°C	3 days

Die Attach Adhesives - Electrically Conductive Pastes

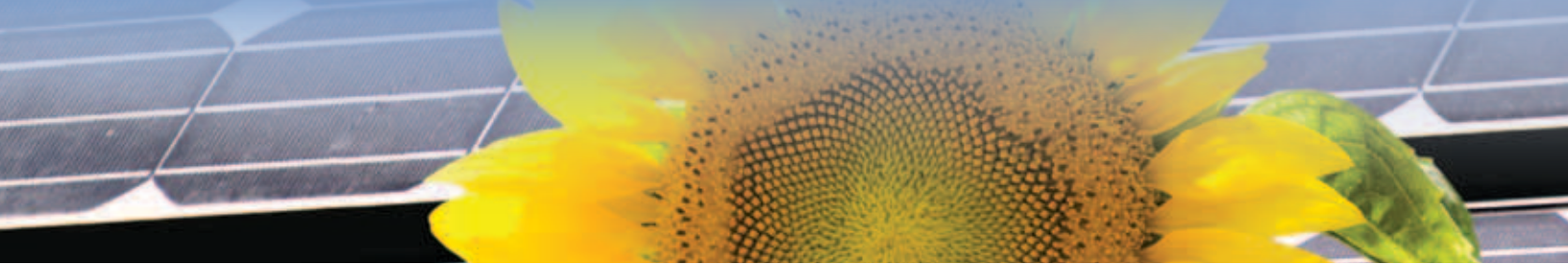
Product	Description	PV Application	Finish (Ag, Cu, Au)	MRT	Electrical Conductivity	Thermal Conductivity, W/mk	Cure Schedule
HYSOL QMI519	JEDEC L1 260°C for SOIC, QFN packages and preplated finishes. Exceptional performance on clean uncoated, Ag-plated finishes. High adhesion, excellent electrical and thermal performance.	Concentrator PV	Ag, Au	L1-260	1×10^{-4}	3.8	≥10 sec. @ 200°C (Skip Cure) 30 min. @ 200°C (Oven)
HYSOL QMI529HT	For component or die attach where very high electrical and thermal conductivity is required. Suitable for high heat dissipation devices and solder replacement applications.	Concentrator PV	Au, Ag	L1-260	4×10^{-5}	7	≥60 sec. @ 185°C (Skip Cure) 30 min. @ 185°C (Oven)

Inks & Coatings - Electrically Conductive Inks

Product	Description	PV Application	Cure Schedules	Sheet Resistance (OHM/SQUARE/25µ)	Shelf Life
ELECTRODAG 461SS	Screen printable silver ink for ITO treated plastic film.	Thin Film	5 min. @ 120°C	<0.020	12 months

PCB Protection - Conformal Coatings

Product	Description	PV Application	Resin Type	Cure Schedules	Viscosity (cPs)	Dielectric Strength (V/mil)	Service Temp. Range
ECCOCOAT SC3613	Optically clear; high purity for semiconductor applications; low stress elastomer; IC and hybrid passivation.	Concentrator PV	Silicone One-Component	Heat Cure: 30 min. @ 120°C	3,500	400	-40 to +200°C
HYSOL PC40-UM	Single component, VOC-free conformal coating. UV cure initiated followed by room temperature moisture cure.	Concentrator PV / Thin Film	Urethane Acrylate One-Component	UV Cure: 30 sec. @ 300-600 mW/cm ² followed by room temp. moisture cure	500	2,000	-40 to +135°C



Solder Materials - Liquid Fluxes

Product	Description	Application	Solids Content, %	Acid Value, mg KOH/g	IPC/J-STD-004 Classification
MULTICORE MF200	Liquid flux recommended for consumer electronics and general electrical lead-free soldering applications, particularly where there has been a high level of mid-pad solder balling.	Crystalline Silicon	6.4	48	ORM0
MULTICORE X32-10i	No residue, halide-free flux with a wider operating window.	Crystalline Silicon	2.5	16	M3CN
MULTICORE X33-08i	Resin-free, no-clean, halide-free liquid flux for surfaces with poor solderability from the pioneers of "no clean" technology.	Crystalline Silicon	1.6	17.5	ORLO

Thermal Management Materials: Phase Change Materials

Product	Description	PV Application	Thermal Impedance (°C-in. ² /W @ 80 psi)	Thermal Impedance (°C-cm ² /W @ 550 kPa)	Thermal Conductivity (W/mK)	Phase Change Temp. (°C)	Thickness (in.)
LOCTITE PSX-D & LOCTITE PSX-P	Repeatable phase change thermal interface material. Supplied as a paste that can be stenciled, needle dispensed, screen printed, or applied manually onto a heat sink, baseplate or other surfaces.	Concentrator PV	0.003	0.022	3.4	45	0.0005 -0.010+

Thermal Management Materials: Thermally Conductive Paste

Product	Description	PV Application	Cure Type	Cure Schedules	Viscosity (cPs)	Thermal Conductivity (W/mK)	Volume Resistivity (OHM.CM)	Shelf Life
ABLESTIK NCP-3003	Epoxy adhesive developed for microelectronic applications. Specially designed for bonding heat generating components and circuitry to heat sinks.	Concentrator PV	Heat Cure	60 min. @ 120°C	60,000	2.1	1.0 x 10 ⁻¹⁵	6 months @ -25°C to -18°C
ECCOBOND TE3530	For bonding heat dissipation parts and components; can be applied by automatic syringe dispensing.	Concentrator PV	Heat Cure	30 min. @ 100°C or 10 min. @ 150°C	60,000	2.3	1.0 x 10 ⁻¹⁵	6 months @ -18°C



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