Electronics and Assembly Materials

H.B. Fuller | Connecting what matters.™

Innovative Adhesive Solutions for Next Generation Electronics

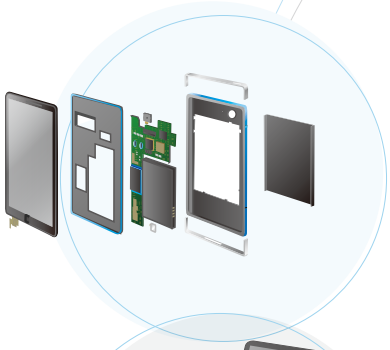
Since 1887, H.B. Fuller has been a leading global adhesives provider focusing on perfecting adhesives, sealants and other specialty chemical products to improve products and lives. With fiscal 2019 net revenue of $3.0 billion, H.B. Fuller's commitment to innovation brings together people, products and processes that answer and solve some of the world's biggest challenges. Our reliable, responsive service creates lasting, rewarding connections with customers in engineering, electronic and assembly materials, hygiene, construction, automotive, packaging and other consumer businesses. And our promise to our people connects them with opportunities to innovate and thrive.

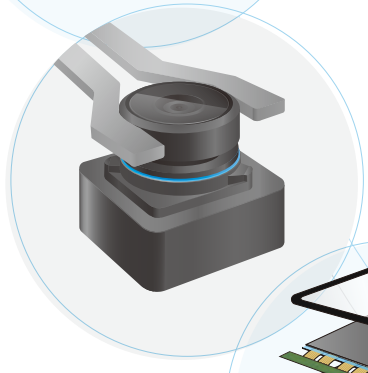
H.B. Fuller's comprehensive adhesive solutions for electronics at all levels combine the knowledge of our performance products and the operating dynamics of the Electronics and Assembly industries. Our performance bonding adhesives, light curable material, sealants, underfills, circle board protection are based on a broad range of chemistries. These bespoke formulations are specifically designed to deliver optimum performance in a range of demanding electronics applications, where various process needs, wide operating temperatures and harsh environments mean a tailored solution is required.

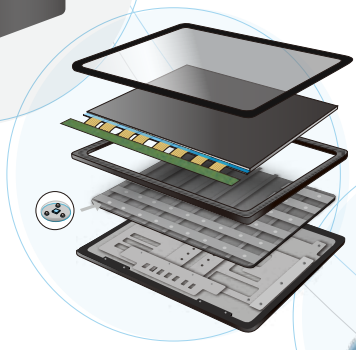
H.B. Fuller understands the dynamics of the electronics industry. The industry participates in a global supply chain environment where products are often designed in one part of the world and assembled in another. This requires a support structure that can provide knowledge and expertise whenever you need it. We provide strong support and service not only on the development and deployment of electronics systems, but also on the equipment infrastructure and process related details. Our Technology Centers of Excellence around the world and newly expended global electronics and materials manufacturing facilities in China provide us reliable, competitive advantages to grow the business together with our customers around the world.

In the fast changing world of electronics, new material challenges are constantly emerging and a partner that can deliver timely solutions is a true source of competitive advantage. For more on how we can help you with adhesive, sealant and encapsulant solutions for your applications, contact our team of electronic material and assembly experts.

For more information, please visit : www.hbfuller.com
or scan the QR code.







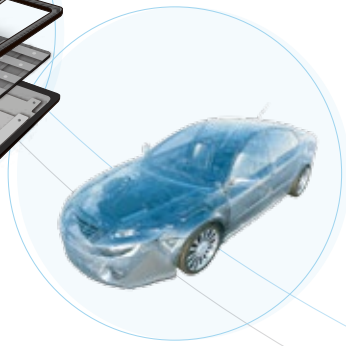


TABLE OF CONTENTS

Electronics Assembly Material

Material Solutions for Specific Markets

Electronics Assembly Materials

Reactive Hot Melt Adhesives

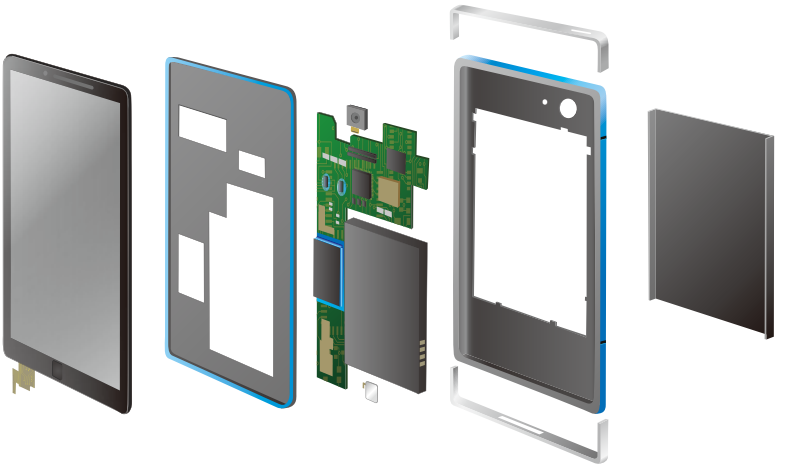
H.B. Fuller's line of reactive hot melt adhesives includes products that are specifically designed for mobile device assembly. Our products are designed to cover a broad spectrum of applications from touch panel assembly to mobile phone parts bonding, by providing a range of performance characteristics including impact, chemical, moisture, and temperature resistance.

Some of these products have gasket-like properties, which provide outstanding sealing and protecting capability for electrical and electronic devices from moisture, water, oils, and contaminants such as dust.

Other products are specially formulated for applications that require reworkability of an assembly. These materials combine high performance and reliability with mechanisms to remove the adhesive and reuse the components.

Our reactive hot melt adhesives offer:

- Robust, tough, single-component construction
- Near instantaneous bond strength
- Adhesion to a wide variety of substrates
- Resistance to chemicals, fuels and oils
- Low MVTR (superior moisture resistance)
- Formation of a resilient, tough polymer after cure, but can also be flexible
- Ultra fast curing materials available



Product	Description	Color	Viscosity at Application Temperature (cPs)	Open Time (min)	Cure Time (h)	OLSS, PC- PC (MPa)
EH9623LV	Designed for LCM light block, ultra low viscosity for thickness control, very fast set	Black	865 @ 100°C	40 sec	24	5.1
EH9631	High green strengh and fast-setting	Light Yellow	20,000 @ 120°C	4	24	6.6
EH9641	Ultra fast curing speed Suitable for most of substrates	Light Yellow	3,700 @ 110°C	2.5	24	8.3
EH9650	General purpose Excellent adhesion on most of substrates Capable of narrow edge bonding	Light Yellow	3,700 @ 110°C	4	24	8.9
EH9652	Excellent adhesion on PET, ABS Capable of narrow edge bonding	Light White	5,800 @ 110°C	6	24	12.6
EH9656	Excellent reliability performance on plastic and metal to substrates Fast curing speed	Light Yellow	2,300 @ 120°C	3	24	8.4
EH9663	High green strength allows immediate handling processing and testing Good adhesion to a wide range of substrates without primers	Light Yellow	3,800 @ 100°C	4	24	6.9
EH9665	High gree strength Good ahdesion to most of substrates Good thermal resistence	Light Yellow	6,000 @ 100°C	4	24	7.2
EH9667	Adhesive forms a tough polymer bond resulting in excellent impact resistance and strong bonds	Light Yellow	5,500 @ 110°C	4	24	6.9
EH9672	High reliability and excellent reworkability Excellent adhesion on most substrates Long open time	Light Yellow	2,500 @ 120°C	15	24	8.3
EH9686	Excellent reliability performance on plastic and metal substrates Good impact resistance with low modulus	Light Yellow	2,500 @ 120°C	6	24	10.8
EH9689	General purpose Excellent adhesion on metal Good green strength	Light Yellow	5,500 @ 120°C	8	24	6.6
EH9691B	Low application temperature (110-130°C) allows the bonding to a wide range of heat sensitive materials	Black	6,500 @ 110°C	4	24	10.0

Electronics Assembly Materials

Low Temperature Cure Adhesives

The general trend in the consumer Electroincs materials industry is moving toward smaller, lighter, thinner and faster products. To deliver lighter, less bulky consumer devices with ever greater processing power is a significant challenge. Consumer device manufacturers need to utilize non-traditional metals, glass and plastic materials in the construction of their products, which requires reduced application temperatures during the assembly process. In addition, high volume manufacturing (HVM) efficiencies mean that products offering slow cure times or short product work life cannot be considered as a solution.

H.B. Fuller's high performance, low temperature cure, reactive adhesives meet current and next generation bonding requirements in the consumer electronics field. As customer designs integrated with heat sensitive parts, the allowable process temperature that can be used in the assembly process is reducing. Whether bonding to low surface energy FPC/PCB or different grades of LCP, you can count on us to partner with you to solve your adhesion challenges.

H.B. Fuller's products for low temperature cure applications offer:

- One part, premixed, adhesives with long RT work life
- Long product shelf life at -20°C storage or below
- Industry-leading, thermal cure kinetics, offering lower temperature cure at short cure time
- High adhesion to a variety of substrates, including glass, metals and common low-temperature stability plastics, such as PC, LCP, PA, PBT, ABS, PPA and different solder masked FR4
- High reliability and thermal resistance
- Low stress
- Easy processing liquid paste and film solutions
- High elongation
- Controlled flow solutions

Low temperature cure adhesives for bonding applications are:

- Camera modules and image sensors
- Finger print sensors
- LED Lens bonding
- Touch panels
- Enclosure bonding
- Die attach
- Wearable device assembly
- Electrical grounding

Product	Description	Color	Viscosity at 25°C (cPs)	Cure Schedule	Pot Life at 25°C (days)	Shelf Life at -20°C (months)
FH8602	Good jetting performance Low shrinkage	White	8,200	5 min @ 80°C 15 min @ 70°C	3	6
FH8620	Low temperature and high bonding strength Stencil printable	Black	35,000	20 min @ 80 °C 50 min @ 70 °C	3	6
FH8621	Excellent toughness Good jetting performance Good bonding strength to PA and LCP	Black	9,200	10 min @ 80 °C	3	6
FH8621L	Excellent toughness Low viscosity, self-leveling Good bonding strength to PA and LCP	Black	6,500	10 min @ 80 °C	3	6
FH8626	High performance material Ultra fast curing High toughness Low shrinkage	White	12,000	5 min @ 80 °C 10 min @ 70 °C	3	6
FH8623M	Low temperature cure, good thermal resistance, high adhesion to variety substrate	White	12,500	5 min @ 80 °C 15 min @ 75 °C	3	6
FH8627M	Designed for Imager sensor assembly Fast curing and high toughness	Black	20,000	10 min @ 80 °C	3	6
FH8632	Designed for magnet bonding Fluorescence indicator	Black	25,000	30 min @ 80 °C	3	6
FH8633	Designed for Imager sensor assembly High bonding strength to LCP	Black	16,500	5 min @ 80 °C	3	6
FH8634	Ultra fast curing magnet bonding adhesive Fluorescent property for easy auto optical inspection	Black	22,940	5 min @ 80 °C	3	6
FH8633T	Very fast curing at low temperature High bond strength on a variety of substrates Excellent thermal performance	Black	24,890	5 min @ 80°C	3	6
FH8636	Very fast curing at low temperature High bond strength on a variety of substrates Low bleeding Excellent thermal performance	Black	24,890	10 min @ 80°C	3	6

Electronics Assembly Materials

Light Curable Adhesives

H.B. Fuller's family of light curable materials uses artificial ultraviolet light to rapidly cure the adhesive after application. These versatile products offer several advantages, including capability in high-speed automation, adhesion to a wide range of materials, and excellent end-use performance. Our light curable adhesives are ideal for a wide range of applications. They are excellent for bonding metal to glass i pplications such as solder joint protection and LCD terminal reinforcement, and for plastic bonding, in applications such as wire reinforcement and camera module bonding.

H.B. Fuller's family of light curable materials is designed to include:

- A variety of viscosity options to meet a range of application conditions
- Products specially formulated for adhesion to metal, ceramic, glass, plastic, PC, and PVC
- Fast cure for capability in high-speed production
- Excellent end-use performance across a broad scope of application

Product	Description	Color	Viscosity at 25°C (cPs)	Cure Energy (mJ / cm²)	Hardness (Shore)	Shelf Life (months)
Metal, Glass, and Ceramic Bonding						
EA6201	Excellent bonding perfromance Shardow area cured by anaerobic	Clear	18,000	2,400	D 60	12 @ 8 - 25°C
EA6202	General purpose Good gap flow	Clear	3,900	1,200	D 70	12 @ 8 - 25°C
EA6203	General purpose Middle viscosity	Clear	8,334	1,200	D 60	12 @ 8 - 25°C
EA6209	General purpose FPC reinforcement on glass	Amber	15,000	2,500	D 70	12 @ 8 - 25°C
Plastic, PVC, and PC Bonding						
EA6027	Non-yellowing Medium viscosity High bonding strength for plastic	Clear	3,100	2,400	D 66	12 @ 8 - 25°C
EA6031	General purpose Low viscosity Good flowability	Clear	300	2,400	D 56	12 @ 8 - 25°C
EA6033	Flexible and high adhesion on FPCB	Semi-transparent Paste	10,700	2,400	D 56	12 @ 8 - 25°C
EA6039	Electronics conponent reinforcement Excellent adhesion on a wide range of materials	Semi-transparent	20,000	2,400	D 65	12 @ 8 - 25°C
EA6042	Designed for circuit board protection	Blue	4,800	3,000	D 62	12 @ 8 - 25°C
EA6051H	Good adhesion to glass,many plastics and many metals Good flexible	Bule	10,000	1,200	A 65	12 @ 8 - 25°C
EA6053H	Rubber ring replacement Very soft after curing	Semi- translucent	30,000	2,400	A 35	12 @ 8 - 25°C
EA6056	Soft material after curing Good gasket and sealant performance	Blue	70,000	2,400	A 18	12 @ 8 - 25°C
UV/Moisture Curing						
EA6105	PCB conponent protection Medium viscosity	Clear Liquid	4,000	2,400	D 60	6 @ 2 - 8°C
EA6107	Designed for circuit board protection and FPCB reinforcement	Semi- translucent blue paste	10,480	2,400	D 70	6 @ 2 - 8°C
EA6110	Designed for circuit board protection	Blue	800	2,400	D 70	6 @ 2 - 8°C
EA6111	Conformal coating material Low viscosity Low odour	Clear	203	2,400	D 70	6 @ 2 - 8°C
EA6112	Designed for circuit board protection	Clear	2,000	2,400	D 70	6 @ 2 - 8°C
EA6114	High adhesion strength Good flexibility	Blue	5,100	3,000	D 70	6 @ 2 - 8°C
EA6116	High adhesion strength Excellent flexibility	Clear	3,600	4,000	D 48	6 @ 2 - 8°C
UV/Thermal Curing						
EA6402M	Designed for image sensor assembly, fast cure at 80°C, high adhesive strength	Black	45,800	UV 3,200 mJ/cm² + 30 min @ 80°C	D 60	6 @ - 40°C
EA6405	High TI for high aspect ratio dispensing, low temperature cure to 70°C, excellent adhesion to plastics and metals	White / Beige	520,000	UV 2,000 mJ/cm² (365nm) + 3h @ 60°C	D 85	6 @ - 40°C
EA6407	Superior adhesion to a wide range of substrates, high Tg for high temperature reliability	Black	192,000	UV 6,000 mJ/cm² (365nm) + 60 min @ 80°C	D 85	6 @ - 40°C
EA6409	Excellent bond strength to glass and plastic substrates, high Tg for high temperature reliability, low cure shrinkage and CTE	White / Beige	35,000	UV 2,000 mJ/cm² (365nm) + 1.5h @ 70°C	D 80	6 @ - 40°C
EA6411	Excellent bond strength to LCP for both UV initial and full cure, high TI for high aspect ratio dispensing, low shrinkage	Black	52,700	UV 4,000 mJ/cm² (365nm) + 30 min @ 80°C	D 55	6 @ - 40°C
EA6412	Excellent bond strength to LCP for both UV initial and full cure, Fast UV cure High TI for high aspect ratio dispensing Low shrinkage	Black	52,700	UV 4,000 mJ/cm² (365nm) + 30 min @ 80°C	D 55	6 @ - 20°C
EA6439	Low modulus for low stress and impact resistance Good flux compatibility Good SIR performance	Light Blue	8,000	UV 2,000 mJ/cm² + 10 min @ 130°C	A 92	6 @ - 20°C

Electronics Assembly Materials

Structural Bonding Adhesives

H.B. Fuller's line of two-component urethane, acrylic, and epoxy adhesive products features unique flexibility in application, cure speed and performance. These materials are formulated for applications where factors like dispensing and cure schedule, as well as performance demands such as abrasion, bond strength, temperature and mechanical shock are an issue. These materials are formulated for precise performance features, which cover a wide range of mechanical, thermal, and electrical performance capabilities.

Our family of structural bonding liquid adhesives includes products designed with:

- Exceptional adhesion to similar and dissimilar substrates
- Tough construction, good impact resistance
- A variety of curing options, such as heat, moisture, UV, or a combination
- Solvent-free formulations
- Halogen-free formulations
- Dimensional stability
- High peel strength
- Low odor with no out-gassing
- Fast, 100% complete cure
- Outstanding chemical resistance
- Materials available to meet specifications such as UL, NSF, etc.

Epoxy	Description	Color	Viscosity at 25°C (cPs)	Mix Ratio	Fixture Time (min)	Working Time at 25°C (min)	Shelf Life at 8 - 25°C (months)
FH8530	General purpose Fast curing	A: Clear B: Clear	A: 17,000 B: 17,000	1:1	5	4	12
FH8530BK	General purpose Fast curing	A: Black B: Clear	A: 17,000 B: 11,000	1:1	8	4	12
FH8530W	General purpose Fast curing Flame resistance	A: White B: White	A: 35,000 B: 55,000	1:1	8	3	12
FH8516	High performance Curing at room temperature High Tg	A: Black B: Yellow	A: 17,000 B: 50,000	2:1	2.5 h	30	6

2K Acrylate	Description	Color	Viscosity at 25°C (cPs)	Mix Ratio	Fixture Time (min)	Working Time at 25°C (min)	Shelf Life at 8 - 25°C (months)
FH7026	High strength and excellent impact resistance High elongation Suitable for most of substrates	A: Off-white B: Blue	A: 18,500 B: 22,000	10:1	5	3	9 @ 2 - 8°C
AC510	High strength to metals and plastics, Especially the excellent strength and aging resistance of galvanized metal	A: Off-white B: Blue	A: 21,000 B: 70,000	10:1	5	2	9
AC619	High strength and aging resistance Fast curing(30s @ 90°C) Suitable for most substrates	A: Off-white B: Blue	A: 55,000 B: 55,000	10:1	5	3	9
AC626	General purpose High strength and impact resistant Suitable for most of substrates	A: Off-white B: Blue	A: 70,000 B: 50,000	10:1	5	3	9
AC768	High strength and impact resistance Low modulus High elongation Suitable for most substrates	A: Off-white B: Blue	A: 20,000 B: 31,000	10:1	7	5	9

2K PU	Description	Color	Viscosity at 25°C (cPs)	Mix Ratio	Fixture Time (min)	Working Time at 25°C (min)	Shelf Life at 8 - 25°C (months)
SP620	General purpose Good adhesion on plastic and composite material	A: Black B: Off-white	A: 8,500 B: 6,500	1:1	55	12	9
EU1005	Low tamperature cure, non-sag, excellent thermal performance	A: White B: Translucent	A: 32,000 B: 38,000	2:1	10 @ 90°C	10	6

Electronics Assembly Materials

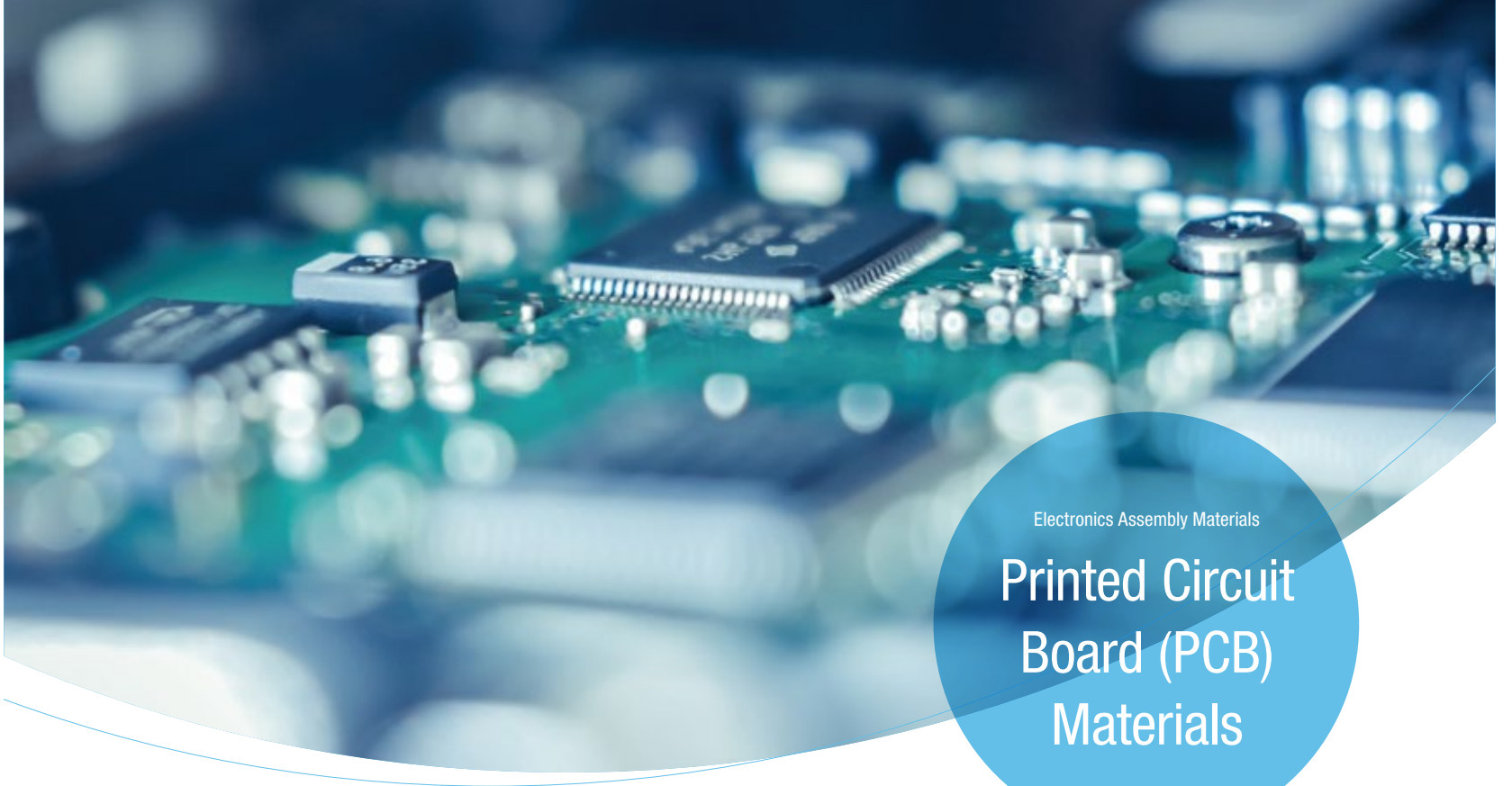
Film Adhesives

Flexel™ reactive films are an advanced alternative to thermoplastic film, hot melt or liquid adhesives and ideally suited for the assembly of soft goods. Flexel™ RFA delivers the performance of a thermosetting adhesive in an easy-to-use film form. These reactive films are ideally suited for the assembly of soft goods. Their low cure activation temperatures are gentle on heat sensitive substrates and won't damage the finish of fine leathers or microfiber. Our thermosetting reactive film has superior heat resistance and chemical resistance compared to thermoplastics adhesives, so customers' products will be more durable. This easy-to-use adhesive technology also doesn't require any special applation equipment, allowing manufacturers to apply exactly the right amount of adhesive precisely where they need it.

H.B. Fuller's reactive film adhesives feature:

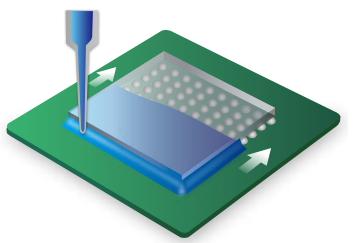
- Easy-to-use film form
- No messy application equipment
- Immediate handling strength
- Low temperature application
- Reactive, cross-linking durability
- High strength and elongation

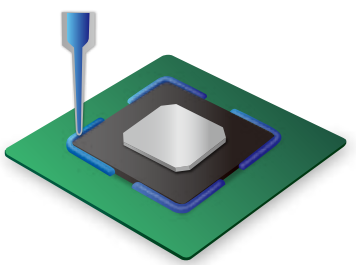
Product	Chemistry	Description	Color	Recommended Substrates	Tacking Temperature	Typical Cure Profile - bond line time & temperature	Typical peel strength on polycarbonate (N/25 mm)	Typical sheer strength on stainless steel (MPa)
EM9002N	Polyurethane reactive film adhesive	Low Activation temperature Highly flexibility and elongation Good heat resistance	Translucent White	Plastics, Textile, Leather	45 - 55 °C	60 s @ 90 °C	60	2
RFA2005N	Polyurethane reactive film adhesive	Very good adhesion to metals	Translucent White	Stainless Steel, Aluminum, Plastics, Textiles, Leather	45 - 55 °C	60 s @ 90 °C	65	10
EF9897	Polyurethane hybrid reactive film adhesive	Low activation temperature, good flexibility and elongation Good weathering resistance Non-yellowing	Milky White	Plastic, Textile, Leather	45 - 50°C	60 s @ 120°C	55	N.A.

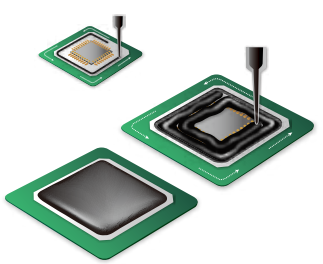


Electronics Assembly Materials

Printed Circuit Board (PCB) Materials







H.B. Fuller's board level materials offer excellent performance and high productivity. Moreover, these board level adhesives facilitate equipment savings and reduce technology investment adding to the customers' bottom line. Being able to match materials for board assemblies provides consistency in manufacturing processes and product performance.

We offer a broad range of products, from multiple chemistries, to meet multiple board assembly applications. Urethane, acrylic, epoxy, and silicone chemistries are used in conformal coatings, adhesives (underfill, die attach, surface mount, thermally conductive) and potting/encapsulants.

In addition, device reliability is a critical measure of product performance in the electronics industry, whether the application is for consumer or industrial assembly applications. H.B. Fuller's range of high-performance underfill and edgebond materials offer reliable structural reinforcement of sensitive device components as well as balanced re-workability, depending on specific customer requirements.

H.B. Fuller underfills typically offer:

- High reliability (drop, shock, autoclave and temperature cycle)
- Fast flow and easy processing
- Reworkability versus reliability balance
- Excellent flux compatibility
- High reliability edgebonds (replacing full underfill)
- Good SIR (Surface Insulation Resistance)

Feature applications:

- Wafer Level Chip Scale Packages (WLCSP)
- Ball Grid Array (BGA)
- Chip Scale Packages (CSPs)

Product Name	Description	Color	Viscosity at 25°C (cPs)	Cure Schedule	Tg (°C)	CTE alpha 1: ppm	Pot Life at 25°C (hrs)	Shelf Life (months)
Board Level Underfill								
FH8006	Designed for high reliability portable devices Fast flow performance	Black	480	8 min @ 130°C	99	65	72	6 @ -20°C
FH8008	Good balance between reliability and reworkability	Black	500	8 min @ 150°C	108	89	72	6 @ -20°C
FH8009	Designed for high reliability portable devices Fast flow performance Reworkable	Brown	627	8 min @ 130°C	96	58	72	6 @ -20°C
FH8011S	Fast flow CSP underfill Low temperature fast curing Very good reworkability	Black	230	5 min @ 120°C	19	75	72	6 @ 2 - 8°C
FH8014	CSP/BGA high performance underfill Very good reworkability Substrate preheat is required	Clear	2,000	10 min @ 150°C	70	65	72	6 @ 2 - 8°C
FH8017M	Fast flow CSP underfill Designed for FPC application Very good reworkability	Black	600	5 min @ 120°C	42	65	72	6 @ 2 - 8°C
FH8020	SMD protection on high density PCBA Low modulusand soft material Fast cure, low shrinkage	Black	13,000	8 min @ 150°C	6.1	78	72	6 @ -20°C
FH8028	Reworkable without damage to the attach pad High reliability design for portable device	Black	400	8 min @ 150°C	125	55	72	6 @ -20°C
FH8029	High reliability, fast flow CSP underfill	Black	600	8 min @ 150°C	135	55	72	6 @ -20°C
WLCSP UF (Flipchip Underfill)								
FH8301	Designed for Flipchip high reliability application High Tg, low CTE High reliability	Black	19,900	120 min @ 165°C	122	35	8	6 @ -40°C
FH8302	Designed for Flipchip high reliability application High Tg, low CTE High reliability High flowability	Black	3,400	120 min @ 165°C	120	32	8	6 @ -40°C
FH8303	Designed for WLCSP high reliability application Low CTE	Black	2,500	30 min @ 150°C	136	32	24	6 @ -40°C
Edge Bond Material								
FH8050	Designed for edge bonding application Self-alignment in lead-free reflow Good dispensing performance and shape retention Capability in narrow edge CSP or WLCSP	Black	Thixotropic	Compatible with lead-free profile	115	81	8	6 @ 2 - 8°C
FH8707HF	BGA side fill application Capability in narrow edge CSP or WLCSP	Black	340,000	120s @ 120°C or 90s @ 150°C	105	67	8	6 @ 2 - 8°C
FH8708T	Good dispensing performance and shape retention Low CTE Good reliability	Black	41,280	5 min @ 120°C	163	24	8	6 @ 2 - 8°C
FH8710	Excellent toughness and bonding strength High Tg, low CTE	Black	16,300	8 min @ 130°C	117	39	24	6 @ -20°C
EA6037C	Designed for electronics reinforcement Excellent adhesion on a wide range of materials	Red to Clear	20,000	UV 2,400 mJ/cm^2	N.A.	N.A.	N.A.	12 @ 8~25°C
Chip on Board								
FH8731	Designed for wirebond chip glob top High flow material	Black	36,400	20 min @ 150°C	129	58	72	12 @ 2 - 8°C
FH8732	Designed for wirebond chip glob top High flow material Low CTE	Black	35,000	30 min @ 125°C + 90 min @ 165°C	95	17	8	6 @ -40°C
FH8733	Designed for wirebond chip glob top Middle flow material	Black	90,000	90 min @ 120°C	124	42	72	6 @ 2 - 8°C

Electronics Assembly Materials

Circuit Board Protection and Encapsulation

Environmental protection of circuits and individual components is necessary to ensure that device integrity and reliability is maintained throughout the operating life of the electronic device. Our conformal coating materials and encapsulation and potting materials are used to meet a wide range of customer board protection requirements – from consumer device assembly to military aerospace applications. These CBP products use a range of different resin and cure chemistries to deliver outstanding environmental protection.

H.B. Fuller's circuit board protection materials typically offer:

- High reliability and environmental protection
- One or two part systems
- Different cure chemistries
- Thermal
- UV/ Light
- UV + Thermal
- UV + Moisture
- RTV (moisture cure)
- Low Shrinkage
- High TGs
- Low CTEs
- Low profile heights
- Easy processing

Typical application areas circuit board protection are:

- Wire bonded die
- Consumer electronic cables and accessories
- PCBs

Conformal Coatings	Description	Chemistry	Color	Viscosity at 25°C (cPs)	Cure Schendule	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
FH1280AB	Good adhsion with parylene Excellent point and sharp edge coverage Excellent mechanical and chemical resistance	Epoxy	Light Yellow	300	3 hrs @ 80°C, 7 days @ 25°C	D 70	6
EA6105	PCB conponent protection Medium viscosity	Modified Acrylate	Clear	4,000	UV Cure UV 2,400 mJ/cm^2	D 60	6
EA6110	Designed for circuit board protection	Modified Acrylate	Blue	800	UV/Moisture UV 2,400 mJ/cm^2	D 60	6
EA6111	Conformal coating material Low viscosity Low odour	Modified Acrylate	Clear	200	UV/Moisture UV 2,400 mJ/cm^2	D 50	6
EA6112	Designed for component encapsulant	Modified Acrylate	Clear	500	UV/Moisture UV 3,000 mJ/cm^2	D 65	6
UV890SF	Excellent dielectric and Proof tracking properties Excellent for thermal shock Solvent-free Suitable for a variety of process requirements	Modified Acrylate	Light Yellow (Fluorescence)	800	UV/Moisture UV 3,500 mJ/cm^2	A 60	6
AC801	Low odor, environmentally friendly Drying at room temperature or heating for fast drying Easy to rework, suitable for a variety of process requirements	Solvent Based Acrylate	Clear (Fluorescence)	30	Tack-free time:10min @ 25°C Full cure time:24h @ 25°C	A 60	12
SP863	Low odor, environmentally friendly Excellent chemical resistance Drying at room temperature or heating for fast drying Different viscosity for suitable for a variety of process requirements	Solvent Based Alkyd	Brown (Fluorescence)	60	Tack-free time:30min @ 25°C Full cure time:48h @ 25°C	A 50	6
SN855	Solvent-free, can spraying Excellent weather resistance Excellent dielectric properties Reworkable	Silicone	Translucent	500	Tack-free time:15min @ 25°C Full cure time:48h @ 25°C	A 20	6
Potting Compounds	**Description**	**Chemistry**	**Color**	**Viscosity at 25°C (cPs)**	**Cure Schendule**	**Hardness (Shore)**	**Shelf Life at 8 - 25°C (months)**
SN558	Shallow potting Low stress Excellent thermal resistant	Silicon	White	1,600	48 hrs @ 23°C	A 20	6
SN756	Thermal conductive 0.8W/m.K Low stress Excellent aging performance	Silicon	Gray	A: 4,500 B: 3,500	24 hrs @ 23°C 40 min @ 50°C	A 58	6
EP425	Shallow potting Curing at medium-high temperature Excellent sealing performance	Epoxy	Black	7,500	30 min @ 80°C	D 85	6 @ 2 - 8 °C
EP706	2K product, mix ratio 1:1 Curing at room temperature, heating can shorten cure time Medium viscosity Excellent sealing performance	Epoxy	A: Black B: Olive	A: 22,000 B: 16,000	24 hrs @ 25°C 12 hrs @ 40°C 2 hrs @ 60°C	D 70	12
Encapsulants & reinforce material	**Description**	**Chemistry**	**Color**	**Viscosity at 25°C (cPs)**	**Cure Schendule**	**Hardness (Shore)**	**Shelf Life at 8 - 25°C (months)**
1527	General purpose Suitable for sealing and component reinforcement	Silicone	White	Paste	48 hrs @ 23°C	A 48	6
1533	Medium viscosity Suitable for solder joint protection and thick coating	Silicone	Traslucence	6,000	48 hrs @ 23°C	A 25	6
SN596	Quick tack-free Excellent electrical,weather and chemical resistance Flame retardant,UL94-V0	Silicone	Gray-black	Paste	48 hrs @ 23°C	A 62	6
UV103	High flexibility and toughness, good moisture resistance and good chemical resistance Excellent adhesion to a wide variety of substrates	Acylate	Light Yellow	50,000	1,500 mJ/cm^2	D 55	12
EA6439	Low modulus for low stress and impact resistance Good flux compatibility Good SIR performance	Acylate	Light Blue	8,000	UV 200 mW/cm^2 (365nm LED) + 10min @ 130°C	A 92	6 @ -20°C

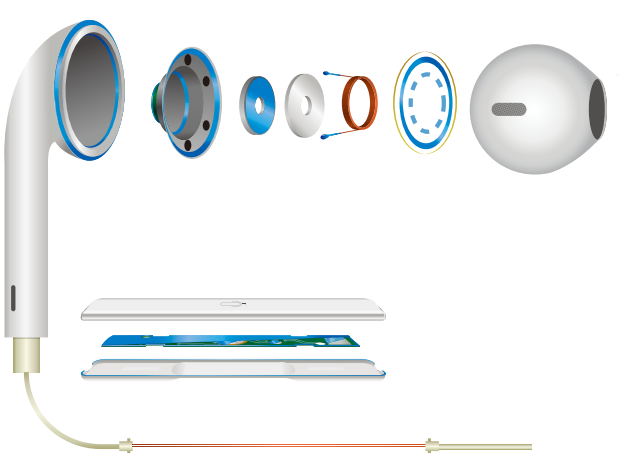
Material Solutions for Specific Markets

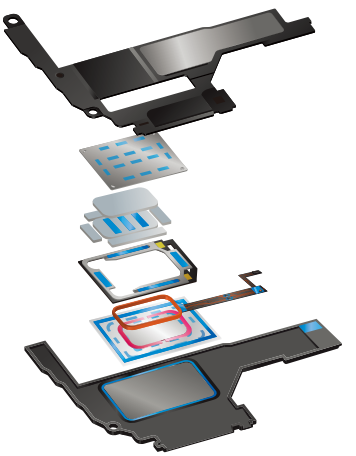
Acoustic Assembly

H.B. Fuller offers a wide range of assembly and protection materials for challenging and various acoustic application requirements. Our products are specifically designed to cover a broad spectrum of acoustic applications to meet the strict dispensing requirements while providing excellent performance, enhancing process efficiency and lowering the total manufacturing cost to acoustic devices manufacturers.

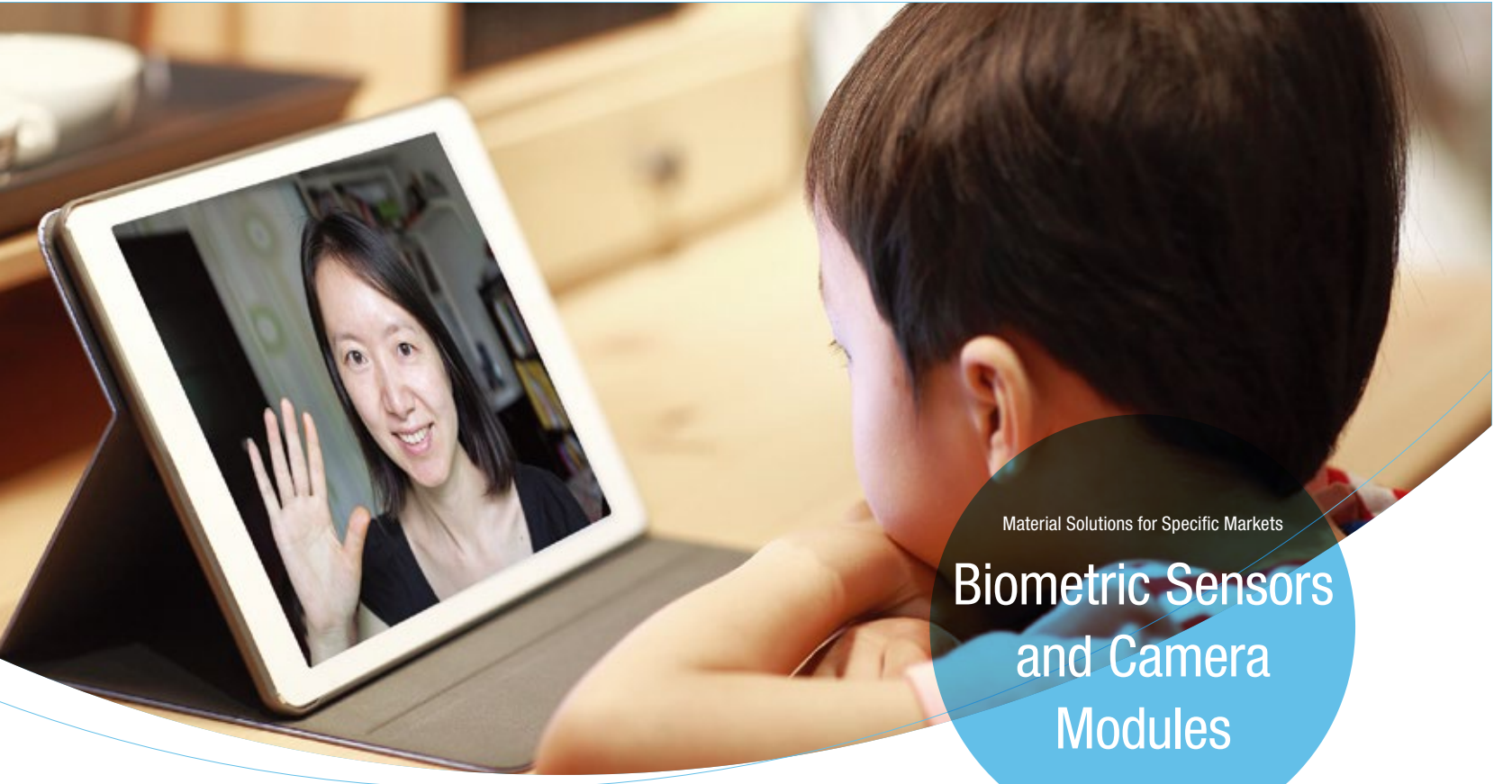
Our high performance solutions for acoustics includes but not limited by the applications:

- House structure bonding
- Gap sealing
- Magnet system bonding
- Membrane-frame bonding
- FPC & chip protection





Product Name	Description	Color	Viscosity at Application Temperature (cPs)	Cure Schedule	Hardness (Shore)	Shelf Life (months)
House Structure Bonding						
EH9645F	High green strength allows immediate handling processing and testing Good adhesion to a wide range of substrates without primers	Light Yellow	4,200 @ 100°C	24 min	D 35	6 @ 15-40°C
EH9650	General purpose Excellent adhesion on most substrates Capable of narrow edge bonding	Light Yellow	3,700 @ 110°C	24 hours	D 35	6 @ 15-40°C
EH9657	Excellent adhesion on variety of substrate, high reliability, creeping resistance	Light Yellow	3,900 @ 100°C	24 hours	D 40	6 @ 15-40°C
FA9203	Cyanoacrylate Low odor, low blooming	Transparent	1,200	24 hours	D 65	12 @ 2-8°C
Magnet System Bonding						
FH8632	Designed for magnet bonding Low temperature cure	Black	25,000	30 min @ 80°C	D 85	6 @ -20°C
FH8632M	Designed for magnet bonding Low temperature cure, good flexibility	Black	10,000	30 min @ 80°C	D 78	6 @ -20°C
FH8634	Ultra fast curing magnet bonding adhesive Fluorescent property for easy auto optical inspection	Black	12,500	5 min @ 80°C	D 85	6 @ -20°C
FH8634M	High bonding strength to ferrite, low shrinkage, good thermal resistance Fast low temperature curable	Black	13,000	5 min @ 80°C	D 75	6 @ -20°C
FPC & Chip Protection						
EA6042	Designed for circuit board protection, good flexibility, fluorescence active	Blue	4,800	30s @ 100 mW/cm^2 (365nm)	D 62	12 @ 8-25°C
EA6044	Designed for circuit board protection, good flexibility, fluorescence active, high thixotropy	Blue	8,000	30s @ 100 mW/cm^2 (365nm)	D 70	12 @ 8-25°C
FH8008	CSP underfill, easy process, good reliability, reworkable	Black	510	8 min @ 150°C	D 82	6 @ -20°C
EA6439	Low modulus for low stress and impact resistance Good flux compatibility Good SIR performance	Light Blue	8,000	UV 200 mW/cm^2 (365nm LED) + 10 min @ 130°C	A 92	6 @ -20°C
Gap Sealing						
EA6054	Excellent adhesion to plastic and metal, good flexibility	Translucent	4,000	24s @ 100 mW/cm^2 (365nm)	A 75	12 @ 8-25°C
Mambrance-Frame Bonding						
EA6051H	Excellent adhesion to platic, glass, and metal, good flexibility	Blue	11,000	24s @ 100 mW/cm^2 (365nm)	A 66	12 @ 8-25°C
EA6058M	Excellent adhesion to plastic, glass, and metal, good flexibility	Translucent	12,000	24s @ 100 mW/cm^2 (365nm)	A 70	12 @ 8-25°C



Material Solutions for Specific Markets

Biometric Sensors and Camera Modules

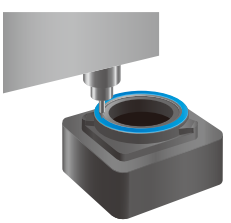
Biometric sensors and camera modules for handheld devices, such as smart phones and tablets, are constantly evolving, which enables handheld device manufacturers to differentiate their products in the market place. This fast moving, innovative market consistently needs better and more sophisticated adhesive technologies to help deliver existing and next generation camera module bonding solutions.

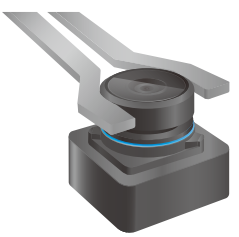
With our comprehensive innovative adhesives solutions, we can provide to the image sensor market:

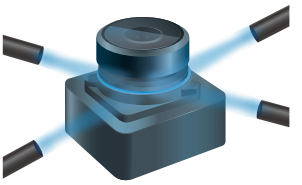
- One component, premixed adhesives with long RT work life
- Industry leading thermal cure kinetics offering lower temperature cure at short cure times
- UV command cure solutions
- High adhesion to a variety of substrates, including glass, metals and common low temperature stability plastics (PC, LCP, PA, PBT and PPA)
- High reliability
- Low shrinkage
- Low stress
- Easy processing liquid paste solutions
- Controlled flow solutions

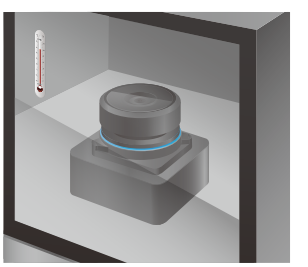
Bonding applications in camera modules and image sensors:

- Active alignment process
- House bonding
- Die attach
- IR glass attach
- VCM assembly
- Flip chip side fill
- Lens/Lens barrel fixing
- Encapsulation
- FPC reinforcement
- Conductive grounding









Product	Description	Color	Viscosity at 25°C (cPs)	Cure Schedule	Pot Life at 25°C (days)	Shelf Life (months)
Die Attach						
FH8800	Optically clear bonding or LED Die attach	Optically Clear	3,175	10 min @ 120°C 30 min @ 100°C	7	6 @ -20°C
FH8808	Low warpage, low stress Low outgassing Low temperature fast cure High bonding strength	Red	18,730	180 s @ 110°C	1	6 @ -20°C
IR Filter Bonding						
FH8621L	Low viscosity, fast curing, good bonding strength to LCP, excellent toughness	Black	6,500	10 min @ 80°C	3	6 @ -20°C
FH8633T	Very fast curing at low temperature High bond strength on a variety of substrates Excellent thermal performance	Black	22,940	5 min @ 80°C	3	6 @ -20°C
UV Heat Solution for Image Sensor Assembly						
EA6405	High TI for high aspect ratio dispensing, low temperature cure to 70°C, excellent adhesion to plastics and metals	White / Beige	520,000	UV 2,000 mJ/cm^2 (365nm) + 3 hours @ 65°C	2	6 @ -40°C
EA6407	Superior adhesion to a wide range of substrates, high Tg for high temperature reliability	Black	192,000	UV 6,000 mJ/cm^2 (365 nm) + 60 min @ 80°C	2	6 @ -40°C
EA6411	Excellent bond strength to LCP for both UV initial and full cure, high TI for high aspect ratio dispensing, low shrinkage	Black	52,700	UV 4,000 mJ/cm^2 (365 nm) + 30 min @ 80°C	2	6 @ -40°C
EA6412	Excellent bond strength to LCP for both UV initial andfull cure, Fast UV cure High TI for high aspect ratio dispensing Low shrinkage	Black	51,340	UV 3,000 mJ/cm^2 (365nm LED) + 60 min @ 80°C	3	6 @ -20°C
EA6419	Excellent bond strength to LCP for both UV initial and full cure, Low viscosity for good flow, nozzle dispensing	Black	14,450	UV 4,000 mJ/cm^2 (365 nm) + 30 min @ 80°C	3	6 @ -40°C
Lens Holder to Substrate (House Bonding)						
FH8627M	Excellent strength to low surface engergy PCB	Black	20,000	10 min @ 80°C	3	6 @ -20°C
FH8633	Designed for image sensor assembly, high bonding strength to LCP	Black	16,500	5 min @ 80°C	3	6 @ -20°C
FH8633T	Very fast curing at low temperature High bond strength on a variety of substrates Excellent thermal performance	Black	22,940	5 min @ 80°C	3	6 @ -20°C
FH8636	Very fast curing at low temperature High bond strength on a variety of substrates Excellent thermal performance	Black	24,890	10 min @ 80°C	3	6 @ -20°C
Motion System Bearing Bonding						
FH8622S	Low modulus to prevent warpage Non-conductive; non-corrosive Fungus-resistance	Black	9,763	10 min @ 80°C 20 min @ 75°C	9	6 @ -20°C
FH8602NB	Low modulus to prevent warpage Non-conductive; non-corrosive	White	360,000	5 min @ 80°C 20 min @ 70°C	14	6 @ -20°C
FH8636	Very fast curing at low temperature High bond strength on a variety of substrates Low bleeding Excellent thermal performance	Black	24,890	10 min @ 80°C	3	6 @ -20°C
Conductive Material Solution						
FH8801C	High electrical conductivity High bond strength Low stress High Tg, low CTE Fast, low temperature cure Low Outgassing	Silver	9,000	90 s @ 110°C 15 min @ 80°C	1	6 @ -40°C

Material Solutions for Specific Markets

Flat Panel Display

Flat panel display is a fast-evolving, innovative market with consumer and industrial device manufacturers constantly striving for better image quality and display resolution. As the industry continues to innovate with different display technologies (LCD and OLED), customers' bonding material requirements are becoming more sophisticated and challenging.

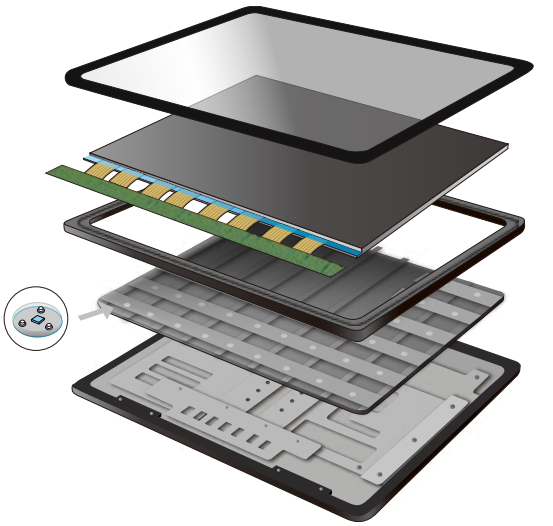
H.B. Fuller's range of display adhesives enable display manufacturers to meet their current and next generation panel bonding needs. Our light curable, low temperature cure, reactive film product chemistries are offering the adhesion of a reactive system that cannot be achieved by PSA films while also eliminating the high cure temperatures of traditional reactive film solutions. In addition, our liquid adhesives for display offer both UV (command cure) capability as well as industry leading thermal cure kinetics, depending on the specific requirements for each distinct application.

H.B. Fuller adhesive materials for display applications typically offer:

- Low temperature thermal or command cure capability
- Short cure times
- Low stress bonds
- Low shrinkage
- Low weight loss
- High adhesion
- High elongation
- High reliability
- Controlled flow

Typical applications served by the existing product range are:

- Chip on Glass (COG) protection
- FPC reinforcement
- Pin terminal bonding
- End sealing
- Glass thinning
- Peelable mask
- ITO protection
- Conductive grounding



General Purpose	Description	Chemistry	Color	Viscosity at 25°C (cPs)	Cure Schendule at 365nm (mJ/cm²)	Hardness (Shore)	OLSS Glass (Mpa)	Shelf Life at 8 - 25°C (months)
EA6204	TN/STN End seal	Acrylate	Amber	8,800	2,000	D 76	11	12
EA6205	Designed for TN/STN metal pin sealant	Acrylate	Light Green	7,000	1,200	D 73	12	12
EA6206	Designed for TN/STN metal pin sealant	Acrylate	Light Green	14,000	1,500	D 75	12	12
EA6209	General purpose FPC reinforcement on glass	Acrylate	Amber	15,000	2,500	D 70	18	6

COG/COF	Description	Color	Viscosity at 25°C (cPs)	Cure Schendule	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
UV423	Low ion content;Non-corrosive for ITO Excellent moisture resistance and insulation performance Low moisture transmittance Easy to rework	Blue	2,000	UV 500 mJ/cm² (365nm)	D 40	6
UV423TB	Ultra-thin coating Low ion content; Non-corrosive for ITO Excellent moisture resistance and insulation performance Low moisture transmittance Easy to rework	Blue	300	UV 2,000 mJ/cm² (365nm)	D 25	6
SN558	Low ion content Non-corrosive for ITO Excellent dielectric property Easy to rework	White / Black	700 1,500	Tack-free time:10min Full cure time: 7 days	A 23	6
UV152	Excellent strength for most substrates Excellent weather resistance	Light Yellow	17,000	UV 1,500 mJ/cm² (365nm)	D 65	12
SP4235	Fluorinated polymer solution Low modulus Excellent chemical corrosion resistance Suitable for effectively protecting the PCB	Light Green	<10	10 min @25°C	D 20	12

AMOLED	Description	Color	Viscosity at 25°C (cPs)	Cure Schendule at 365nm (mJ/cm²)	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
UV426T	Low moisture transmittance Low ion content AMOLED Bending area protection to prevent line damage	Light Yellow	1,000	2,000	A 50	6
UV423T	Ultra-thin coating Low ion content,Non-corrosive for ITO Excellent moisture resistance and insulation performance Low moisture transmittance AMOLED coating area protection	Light Yellow	300	300	D 30	6

LED Bar	Description	Color	Viscosity at 25°C (cPs)	Cure Schedule	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
SP192	Free of solvents, isocyanates, silicones and PVC Good adhesion without primer to many substrates	White	Paste	Tack-free 30min Full curing 24hrs	A 35	6
EH2705	Thermal and solvent resistance Good low-temperature flexibility Low modulus/high impact strength	Yellow	12,000 @ 170°C	N.A.	N.A.	12

Border Sealing	Description	Color	Viscosity at 25°C (cPs)	Curing Schedule	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
UV379	Good adhesion to plastic low compression permanent deformation, good cushioning and damping performance	Dark-gray	10,000	UV 1,000 mJ/cm^2 (365nm)	A 57	6
UV456	Fast curing Suitable for border sealing in LCM amessbly	Black	7,000	UV 500 mJ/cm^2 (365nm)	D 50	12
FH1009MB	Fast curing Suitable for assembly applicationin Suitable for most of substrates	Black	20,000	Tack-free time:10min Fixture time: 4hrs Full cure time: 7 days	A 55	6

Silver Filled Electrically Conductive Adhesive	Description	Chemistry	Color	Viscosity at 25°C (cPs)	Curing Schedule	Volume Resistivity (ohm.cm)	Shelf Life at 8 - 25°C (months)
ECA903	Fast curing No need for refrigeration Suitable for IPS mobile screen application	Acrylate	Silver Gray	6,000	5 min @ 25°C (≦0.2mm)	$2X10^{-3}$	6

Lens Bonding	Description	Color	Viscosity at 25°C (cPs)	Cure Schedule	Pot Life at 25°C (days)	Shelf Life at -20°C (months)
FH8620	Low temperature and high bonding strength Stencil printable	Black	35,000	20 min @ 80 °C 50 min @ 70 °C	7	6
FH8626	High performance material Ultra fast curing High toughness Low shrinkage	White	12,000	3 min @ 80 °C 10 min @ 70 °C	3	6

TV Sealant	Description	Color	Viscosity at 25°C (cPs)	Cure Schendule at 365nm (mJ/cm^2)	Hardness (Shore)	Shelf Life at 8 - 25°C (months)
EA6053H	Rubber ring replacement Very soft after curing	Semi-translucent	30,000	2,400	A 35	12

Material Solutions for Specific Markets

Automotive Electronics

Our automotive electronics adhesives are targeted towards high-performance bonding applications for a wide variety of assembly applications throughout the vehicle including Advanced Driver Assist Systems (ADAS), video screens, engine-control computers, power steering and braking, lighting controls, and keyless entry.

As an automotive electronics manufacturer, you want to be confident that you're providing superior products that are poised to meet growth, and that help make driving an all-around safer, more enjoyable experience. From state-of-the-art cameras and radar emergence to lane departure and autonomous cruise control, you understand best how these electronic systems work together to identify objects and potential hazards for the drivers to help keep them safe on the road.

You also want to be sure that you're staying on top of emerging automotive electronics adhesive design trends so that your products address consumer demand, some of which include environmental friendliness, high performance, efficiency, compatibility, connectivity, and safety. Following are some of our capabilities regarding each of the emerging trends.

- Environmental Friendliness: we utilize renewable materials made from natural or synthetically produced products, and that are biocompatible to ensure no adverse effects will occur
- High Performance: we increase the bond strength and environmental stability, enabling us to reduce the overall bond area with outstanding durability and to pass rigorous reliability testing standards
- Efficiency: we design materials that can be easier to use and at the meantime we have process experts working with customers to optimize the proces
- Compatibility: we use low curing temp and alternative curing methods such as UV to avoid the damage of substrates and components and ensure compatibility with customer processes and many substrates (including CTE issues)
- Connectivity: we enable and enhance a variety of integrated solutions as vehicles continue to increase connectivity with more devices and networks, and as visual data collection and communications technologies improve
- Safety: we help enhance safety with an integration of superior electronics that are capable of observing and reporting statuses, including lane monitoring and autonomous driving

Image Sensor Module Assembly Material

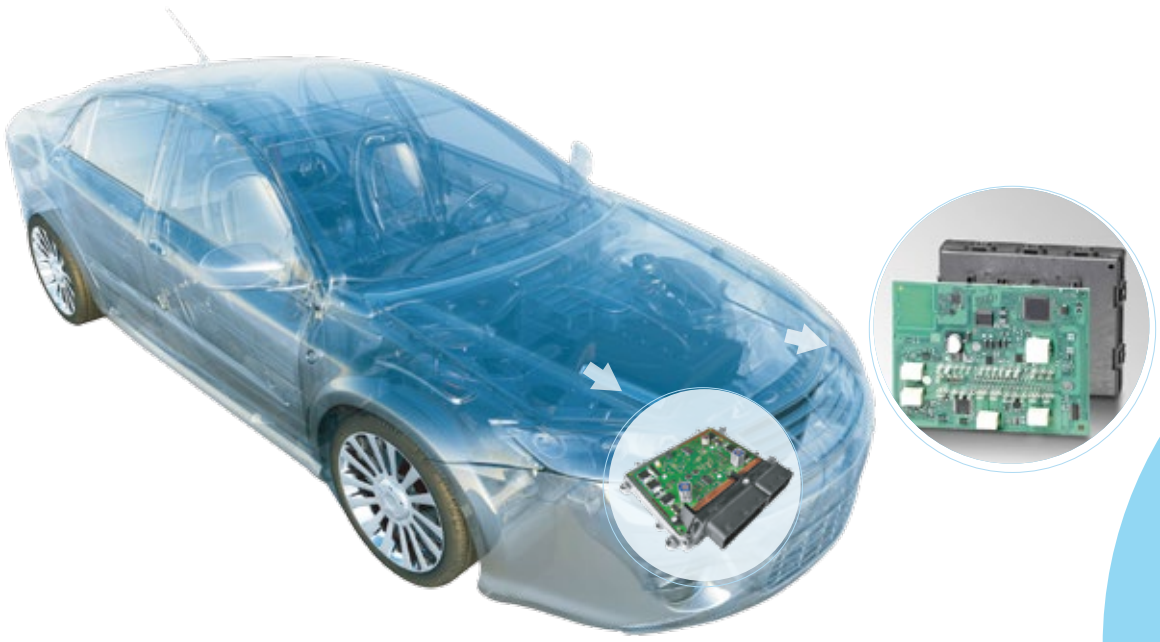
Product	Description	Color	Viscosity at 25°C (cPs)	Cure Schendule	Tg (°C)	OLSS, Anodized Al/Anodized Al (MPa)	Shelf Life (months)
AD2102	Faster UV fixture Low CTE Excellent high temperature high humidity resistance Good bonding to metal	Yellow	16,480	UV 4000 mJ/cm^2 (365nm LED) +30 min @ 80°C	124	7.3	6 @ -20°C
AD2103	Low curing shrinkage High Tg, low CTE Excellent high temperature high humidity resistance Good bonding to metal	White	15,240	UV 4000 mJ/cm^2 (365nm LED) +30 min @ 80°C	143	38.5	6 @ -20°C
AD2103M	Low curing shrinkage High Tg, low CTE Excellent high temperature high humidity resistance Improved adhesion on PA/Nylon	White	16,240	UV 4000 mJ/cm^2 (365nm LED) +30 min @ 80°C	154	8.3	6 @ -20°C
FH8516	Two-part epoxy High performance Curing at room temperature High Tg Mix ratio 2:1	A: Black B: Yellow	A: 17,000 B: 50,000	24h @ 25°C 2h @ 60°C	103	15.5	6 @ 8-25°C
FH8526	Two-part epoxy High Tg, low stress Excellent reliability Mix ratio 2:1	A: Black B: White	A: 110,800 B: 100,700	8h @ 25°C 45 min @ 85°C	77	8.25(PA/PA)	12 @ 8-25°C

IVI Display Assembly Material

Product	Description	Chemistry	Color	Viscosity at Application Temperature (cPs)	Open Time (min)	OLSS, Anodized Al/Anodized Al (MPa)	Elongation (%)	Shelf Life (months)
AE3210	High green strength Good bonding to various substrates Good reliability Easier process to apply	Polyurethane	Black	6,500 @ 170°C	4	20.7	650	9 @ 8-25°C
AE3212B	High green strength Good bonding to various substrates Easier process to apply	Polyurethane	Black	3,000 @ 140°C	4	14	1,050	6 @ 8-25°C
AE3216B	Fast setting Good bonding to various substrates Excellent reliability, thermal resistance	Polyurethane	Black	6,000 @ 120°C	4	5	500	6 @ 8-25°C
FS2140	Moisture curing and fast curing Excellent reliability, thermal resistance	Silicone	Black	Paste	3 (tack free time)	2	260	6 @ 8-25°C

PCB Assembly Material

Product	Description	Chemistry	Color	Viscosity at 25°C (cPs)	Cure Schendule	Tg (°C)	Shelf Life (months)
FH8708T	Good dispensing performance and shape retention Low CTE, good reliability	Epoxy	Black	41,280	5 min @ 120°C	95	6 @ -20°C
FH8307	Suitable for variety of IC packages, BGA/CSP, SIP High Tg, low CTE Withstand lead-free reflow, after exposed to JEDEC level II	Epoxy	Black	4,720	10 min @ 160°C	130	6 @ -20°C
FH8028	Reworkable without damage to the attach pad High reliability design for portable device	Epoxy	Black	400	8 min @ 150°C	125	6 @ -20°C
FH8014A	Easy capilary flowing at room temperature High performance Underfill Very good reworkability	Epoxy	Black	656	10 min @ 130°C	82	6 @ -20°C
EA6439	Low modulus to prevent warpage High and low temperature resistance	Acrylic	Light Blue	8,000	UV 2,000 mW/cm^2 + 130°C for 10 min	15	6 @ -20°C
FS3005	Quick tack-free Excellent electrical,weather and chemical resistance Flame retardant,UL94-V0	Silicone	Gray-black	Paste	48 hrs @ 25 °C	-80	6 @ 8-25°C
FH8746	One part fast curing at heat Suitable for most substrates	Epoxy	Black	7,500	30 min @ 80°C	100	6 @ 2-8°C



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