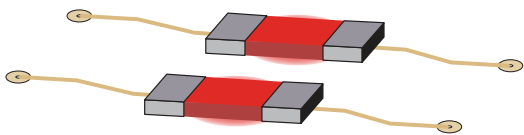


# Surface Mount Adhesives (SMA) / Solder Replacements Applications



**Surface Mount Adhesives / Solder Replacements (SMA)** generally refer to **silver-filled, electrically conductive epoxies** only. At the level 2 and 3 electronic packaging hierarchy, most SMDs are soldered to the PCB/substrate via the historical SMT process.

**EPO-TEK®** silver epoxies are used instead of solder joining, for several reasons, including:

- Component miniaturization achieved by dispensing silver epoxies “dots” of 75um with 125um pitch without bridging.
- A “cold solder” solution for double-sided PCBs in the form of an SMA to protect the joints during 2<sup>nd</sup> solder reflow cycle.
- Lower stress due to silver epoxy joints having a lower modulus than SAC solder, which is much more brittle and prone to fatigue.

As a result of removing the lead from traditional solder pastes, reflow temperatures have increased from 180°C to 260°C, potentially causing damage to sensitive components. Therefore, more electronic packaging is done with silver epoxy for a lower cost, and a lower stress solution.

EPO-TEK	NO. of COMPONENTS	COLOR Before/ After CURE (thin film)	CURE TEMPERATURE (minimal)	VISCOSITY @ 23°C	GLASS TRANSITION TEMPERATURE (Tg)	DIE SHEAR STRENGTH @ RT (80mil x 80mil)	INDEX OF REFRACTION (Nd)	SPECTRAL TRANSMISSION	TGA DEGRADATION TEMPERATURE	CTE Below Tg/ Above Tg (in/in/°C)	POT LIFE (@ room temp.)	SHELF LIFE (@ room temp.)
<b>Adhesives replace BGA solder balls, and solder ball arrays, as well as for wafer level and PCB level flip chips</b>												
SEMICONDUCTOR DEVICES	H20E-PFC	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	3,000-4,000 cPs @ 100 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	407°C	21 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	3 days 1 year
	E2101	Two	Silver/Silver	175°C – 15 min 150°C – 1 hours	15,000-18,000 cPs @ 20 rpm	≥90°C	≥5 kg/1,700 psi	N/A	N/A	455°C	56 x 10 <sup>-6</sup> 131 x 10 <sup>-6</sup>	5 days 1 year
<b>Adhesives to replace Au/Sn eutectic soldering process &gt;300°C</b>												
MEDICAL	H81A	Two	Brown/Brown	150°C – 1 hour	250,000-300,000 cPs @ 0.5 rpm	>100°C	N/A	N/A	N/A	N/A	N/A	1 year
	H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days 1 year
<b>Adhesive replaces solder ball flip chip bonding of X-ray and CT detector device packaging</b>												
OPTO – ELECTRONICS	E4110-PFC	Two	Silver/Silver	150°C – 1 hour 120°C – 1 hour	50,000-60,000 cPs @ 5 rpm	≥40°C	≥5 kg/1,700 psi	N/A	N/A	337°C	48 x 10 <sup>-6</sup> 207 x 10 <sup>-6</sup>	2-3 hours 1 year
	H20E-PFC	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	3,000-4,000 cPs @ 100 rpm	≥80°C	≥5 kg/1,700 psi	N/A	N/A	407°C	21 x 10 <sup>-6</sup> 94 x 10 <sup>-6</sup>	3 days 1 year
<b>Adhesive replaces solder joining of SMD caps and resistors bonded to ceramic PCBs</b>												
MILITARY MICROWAVE RF	H20E	Two	Silver/Silver	175°C – 45 seconds 80°C – 3 hours	2,200-3,200 cPs @ 100 rpm	≥80°C	>5 kg/1,700 psi	N/A	N/A	425°C	31 x 10 <sup>-6</sup> 158 x 10 <sup>-6</sup>	2.5 days 1 year
	H21D	Two	Silver/Silver	150°C – 5 min 120°C – 15 min 80°C – 90 min	14,000-20,400 cPs @ 20 rpm	≥100°C	≥5 kg/1,700 psi	N/A	N/A	457°C	26 x 10 <sup>-6</sup> 124 x 10 <sup>-6</sup>	15 hours 1 year
	H31	One	Silver/Silver	150°C – 1 hour	15,000-25,000 cPs @ 5 rpm	≥110°C	≥5 kg/1,700 psi	N/A	N/A	370°C	48 x 10 <sup>-6</sup> 201 x 10 <sup>-6</sup>	28 days 3 months
	H35-175MP*	One	Bright Silver/Silver	180°C – 1 hour 165°C – 1.5 hours	22,000-28,000 cPs @ 10 rpm	≥100°C	≥10 kg/3,400 psi	N/A	N/A	372°C	31 x 10 <sup>-6</sup> 97 x 10 <sup>-6</sup>	28 days 1 year @ -40°C
	H37-MP*	One	Silver/Silver	150°C – 1 hour	22,000-26,000 cPs @ 10 rpm	≥90°C	≥10 kg/3,400 psi	N/A	N/A	358°C	52 x 10 <sup>-6</sup> 148 x 10 <sup>-6</sup>	28 days 1 year @ -40°C

\* Military Grade

N/A - not applicable, as these are filled systems



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