ADHESIVES FOR DIE ATTACH

ADVANCED TECHNOLOGY FOR RESEARCH & INDUSTRY

KNOWLEDGE BASE FACT SHEET

- SCOPE: This is a guide to the different types of die attach adhesives available from Inseto. Both traditional die attach adhesives (wire-bonded) and flip-chip (Z-axis) adhesives are previewed, with a brief overview of each adhesive. Finally, a comparison chart is provided to help choose the most appropriate solution.

Inseto supplies a range of non-conductive epoxies for various die attach applications found in microelectronic and related semiconductor applications. Non-conductive epoxies are used where the device requires no electrical transmission through the back of the die. Electrically conductive materials, also known as isotropic adhesives, are used where the device requires an electrical transmission through the back of the die. Thermally conductive die attach adhesives transmit heat but are electrically insulating.

The choice of adhesive is usually dictated by the IC designer, especially regarding electrical conductivity. However, for cost reasons, electrically conductive adhesives are only chosen where absolutely necessary, as they are significantly more expensive that non-conductive adhesives. A need for thermal conductivity often doesn't become apparent until the first prototype parts are assembled and tested.

Note: All adhesives are 1-part, solvent-free.

Comparison Chart

	Electrically Conductive	Viscosity (mPa s)	Heat Cure	Heat Cure Mandatory?	Light Cure	Tg	CTE α1	CTE α2	Shelf Life	Pot Life	Package Size	Lead Time	Other
DB IC343	Y	42,000	10m @ 100C	Y	1 - 5s	88C	150ppm	N/A	6M, -18C	72 hrs	10ml	3 - 5 Weeks	Tg very dependant on curing mechanism
MP TC2270	N	140,000	90m @60C	Y	No	40C	22ppm	98ppm	3M, -18C	48 hrs	10ml	5 - 7 Weeks	Thermally conductive
DB AD340	N	15,600	30m @ 80C	Y	1 - 5s	75C	115ppm	182ppm	6M, -18C	72 hrs	10ml	5 - 7 Weeks	
DB AD761	N	6,000	5m @ 130C	N	15s	TBD	TBD	TBD	6M, 0-10C	28 days	1L	5 - 7 Weeks	
DB BS3770	N	115,000	40m @ 150C	Y	10s	-57C	83ppm	253ppm	3M, -18C	48 hrs	10ml	5 - 7 Weeks	Also suitable for B-staged lid attach
MP DA255	N	33,000	8m @ 120C	Y	No	139C	58ppm	170ppm	6M, -18C	72 hrs	10ml	3 - 5 Weeks	Can be thermode-cured in 6s at 180C
MP DA587	N	31,000	5m @ 130C	Y	No	72C	94ppm	168ppm	6M, -18C	5 days	10ml	3 - 5 Weeks	Flexible
MP DA588	N	31,000	5m @ 130C	Y	No	66C	70ppm	166ppm	6M, -18C	72 hrs	10ml	5 - 7 Weeks	
MP LT354	N	145,000	30m @ 80C	Y	1 - 5s	50C	91ppm	195ppm	6M, -18C	72 hrs	10ml	1 - 2 Weeks	Small particle size, d95 = 21µm
DB OB749	N	14,000	60m @ 80C	N	2 - 6s	95C	44ppm	93ppm	6M, -18C	5 days	10ml	3 - 5 Weeks	Meets NASA / ESA outgassing; can be used as Fill
DB OB786	N	32,000	50m @ 80C	N	4s	179C	38ppm	53ppm	6M, -18C	3 days	10 & 30ml	1 - 2 Weeks	
DB OB787	N	46,800	60m @ 80C	N	2 - 6s	185C	45ppm	79ppm	6M, -18C	5 days	10 & 30ml	3 - 5 Weeks	
DB OB793	N	125,000	60m @ 80C	N	5 - 10s	130C	54ppm	101ppm	6M, -18C	72 hrs	10ml	5 - 7 Weeks	

Non-Conductive Die Attach Adhesives

DELO DUALBOND AD340 – an unfilled epoxy suitable for temperature-sensitive substrates (curing at 80°C in 30 minutes). Can be light-fixed in seconds for high-placement accuracy.

DELO DUALBOND AD761 – a fast-curing epoxy (3 minutes at 150°C) with excellent compliance for larger die applications. Can be light-fixed in seconds for high-placement accuracy. Very long pot life of 7 days.

DELO DUALBOND BS3770 – a B-Staged epoxy also suitable for lid attach. A-stage cured in 10 seconds using UV light, then B-Staged in the oven for 40 minutes at 150°C. Suitable for a flexible manufacturing process.

DELO MONOPOX DA255 – an unfilled epoxy ideal for fast-curing applications: 2 minutes at 150°C (or thermode cure in 6 seconds at 180°C). Very high die shear strength of 210 Newtons.

DELO MONOPOX DA587 – an unfilled epoxy ideal for fast-curing applications: 2 minutes at 150C. Longer than usual pot life of 5 days.

DELO MONOPOX DA588 – an unfilled epoxy ideal for fast-curing applications: 2 minutes at 150C. Ideal for Smart Card applications.

DELO DUALBOND LT354 – an unfilled epoxy suitable for temperature-sensitive substrates (curing at 80°C in 30 minutes). Can be light-fixed in seconds for high-placement accuracy.

DELO DUALBOND OB749 – an unfilled epoxy with independent heat-curing (60 minutes at 80°C) and light-curing (2 - 6 seconds at 60 mW/cm^2) mechanisms. Complies with ESA (ECSS-Q-70 02) and NASA (ASTM E 595-93) outgassing requirements.

DELO DUALBOND OB786 – an unfilled epoxy with independent heat-curing (50 minutes at 80°C) and light-curing (4 seconds at 150 mW/cm^2) mechanisms. Very high Tg of 179°C.

DELO DUALBOND OB787 – a high viscosity unfilled epoxy with independent heat-curing (60 minutes at 80°C) and light-curing (2 - 6 seconds at 60 mW/cm^2) mechanisms. Very high Tg of 185°C.

DELO DUALBOND OB793 – a high viscosity unfilled epoxy with independent heat-curing (60 minutes at 80°C) and light-curing (5 - 10 seconds at 60 mW/cm^2) mechanisms.

Conductive Die Attach Adhesives

DELO DUALBOND IC343 – a silver-filled epoxy that has an optional UV-curing capability; a 1 - 5 second UV tack-in-place followed by 30 minutes at 80°C; ideal for high-accuracy placement requirements; extremely low outgassing, meeting international HDD (Hard Disk Drive) requirements (>> ESA / NASA).

Thermally Conductive, Electrically Insulating Die Attach Adhesives

DELO MONOPOX TC2270 – filled with aluminium nitride for enhanced thermal conductivity (1.7W / m*K). Very low temperature curing (90 minutes at 60°C). Meets JEDEC MSL1 requirements.

Anisotropic Conductive Adhesives

Comparison Chart

	Colour	Filler	Particle Size (d50, µm)	Viscosity (mPa s)	Heat Cure	Tg	CTE α1	CTE α2	Water Abs. (% by weight)	Shelf Life	Pot Life	Package Size	Lead Time
AC265	Grey	Au-Ni Polymer	2.5	37,000	8s @ 180C	135C	61ppm	180ppm	0.4	6M, -18C	14 days	5ml	1 - 2 Weeks
AC268	Black	Nickel	5	28,000	8s @ 170C	153C	60ppm	170ppm	0.25	6M, -18C	3 days	5ml	1 - 2 Weeks
AC6530	Grey	Nickel	5	20,000	1s @ 230C	161C	71ppm	134ppm	0.2	6M, -18C	3 days	5ml	5 - 7 Weeks
AC6545	Grey	Nickel	5	42,500	1s @ 230C	165C	54ppm	TBD	0.2	6M, -18C	3 days	5ml	5 - 7 Weeks

All anisotropic (Z-axis) adhesives require both heat and pressure (usually from a thermode or on the die bonder, with the collet holding the die in place) in order to achieve electrical conductivity in the Z-axis. A typical pressure is 1 - 2 Newtons / mm^2, based on a 1mm-square die.

DELO MONOPOX AC265 – filled with gold-over-nickel plated polymer particles, typical size of 2.5µm. Cures in 6 seconds at 200°C. Extended pot life of 2 weeks.

DELO MONOPOX AC268 – filled with nickel particles, typical size of 5µm. Cures in 6 seconds at 190°C.

DELO MONOPOX AC6530 – filled with nickel particles, typical size of 5µm. Cures in 1 second at 230°C.

DELO MONOPOX AC6545 – filled with nickel particles, typical size of 5µm. Cures in 1 second at 230°C.

More detailed information on all of Inseto's die attach adhesives can be found HERE.

A general overview of the various die attach processes can be found HERE.

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