DELO


Smart card

Smart Card

Adhesive Excellence and Process Intelligence

More than an adhesives manufacturer

The worldwide leader in products for the smart card industry

DELO® supplies a comprehensive product range adapted to all applications and requirements in the smart card industry. Advanced technology and extremely high quality have made DELO® the market leader in this segment.

- Technology and innovation leader
- More than 20 years of experience in the smart card industry
- Mature, long-term proven product range for all applications
- Innovative solutions and products for new applications and requirements:

(Adhesive colored magenta for illustration purposes)

We go with you every step of the way!

- Determination of the most efficient bonding approach to your particular application
- Custom development for specific needs
- Lab support for determination of process parameters
- Processing instructions available
- Worldwide technical backup by our experts during the production process
- Perfected and long-proven portfolio of products
- References and analyses results
- Worldwide network of partners, see below

Equipment suppliers

Mühlbauer
High Tech International

ruhlamat® MACK GROUP
solutions for your needs.

Substrate suppliers

LINXENS
access to excellence

Powered by LG Innotek

POSSEHL ELECTRONICS

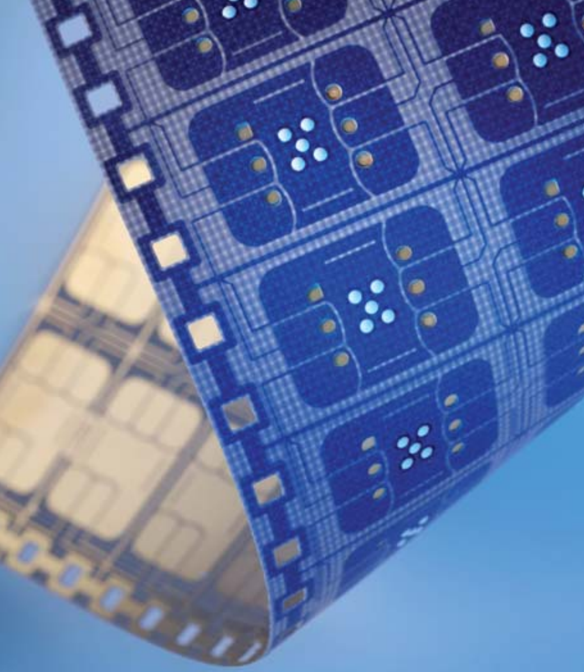
Verified quality

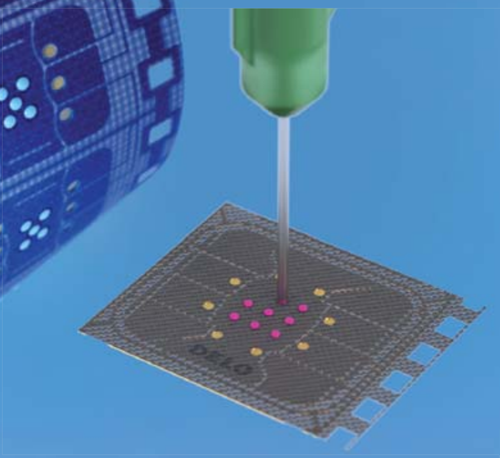
DELO®'s smart card products have been tested and proven reliable. Our customers have tested and passed the most difficult tests in the industry:

- TMCL temperature cycling
- Thermal storage
- THB temperature and humidity storage
- Pressure cooker
- Bending test
- Torsion test
- Wrapping test on card or module basis
- 3-wheel test
- Linear pressure test on module basis
- Punctual load test on module basis
- HAST

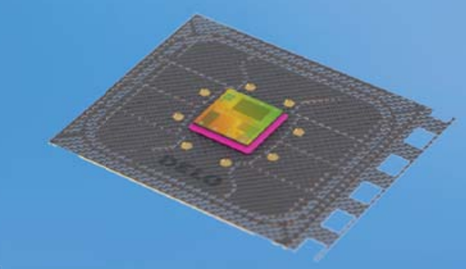
Satisfied customers

gemalto security to be free
NEDCARD
Infineon technologies
SF
DTT 大唐微电子 DATANG MICROELECTRONICS
东信和平 EASTCOMPEACE
ETERNAL
VALID
CEITEC S.A semiconductors
INESA Intelligent Electronics 仪电智能电子
and many more





In the first step, the adhesive is dispensed with a shower head (multiple dispensing needle) or a single dispensing needle.



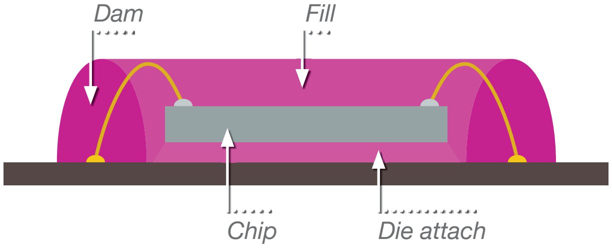
In the second step, the chip is placed, and the adhesive is evenly distributed. The adhesive quantity dispensed should be adjusted in such a way that the chip surface is completely wetted and the adhesive forms a circular but preferably small fillet.

Die attach

Die attach for contact modules and dual-interface modules

- Excellent adhesion to various substrates
- Fast curing and long processing time for an efficient production process
- Low bleeding and optimal compatibility with DELO®'s Dam & Fill or glob top adhesives
- High reliability at elevated humidity, temperature, and temperature shock
- Highest reliability in relevant mechanical tests of smart cards (see page 3, "Verified quality")
- Low ion content and low corrosion potential
- Dam & Fill can be transported in same container
- High cost-saving potential thanks to larger cartridges

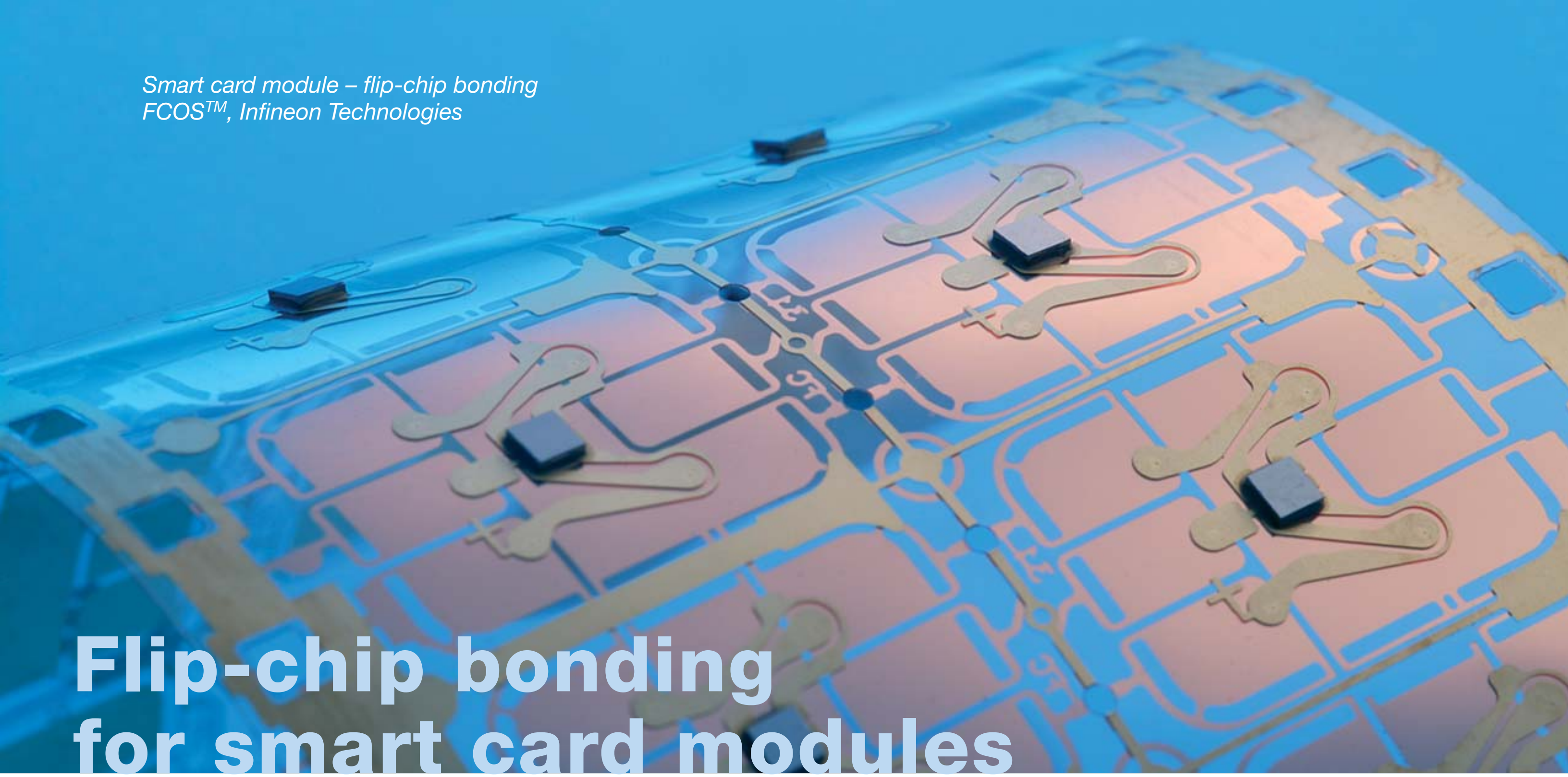
DELO®'s die attach for contact modules and dual interface modules:
Ideal in combination with DELO®'s chip encapsulants



DELO®'s die attach adhesives and chip encapsulants are perfectly compatible with each other. Both are configured on the same chemical basis. This ensures that the encapsulants establish optimum adhesion to DELO®'s die attach adhesive.

	DELO® MONOPOX		
	DA587	**DA588**	**DA589**
Color	white	blue	silver gray
Filler	pigment	pigment	silver flake
Adhesion to substrates	glass / epoxy tape, Au metallization, Si chip, plastic leadframes like PET, PEI		
Conductivity	–	–	dissipation of electrostatic charge
Halogen-free	halogen-free according to IEC 61249-2-21	halogen-free according to IEC 61249-2-21	halogen-free according to IEC 61249-2-21

DA = **D**ie **A**ttach



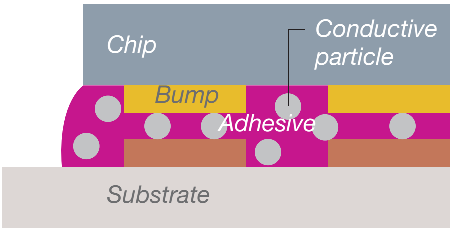
Smart card module – flip-chip bonding
FCOS™, Infineon Technologies

Flip-chip bonding for smart card modules

Anisotropic conductive and non-conductive adhesives

In the production of smart card modules, flip-chips are an economic alternative to the chip-on-board technology. To bond flip-chips, DELO® MONOPOX NU* or DELO® MONOPOX AC* adhesives are used on conventional substrates, such as PC, PC/ABS, PEN or PET.

- Fast heat curing; curing possible in 6 s
- Curing temperatures can be set between +176 °F (+80 °C) and +410 °F (+210 °C), depending on process and substrate. Curing proceeds faster with increasing temperature.
- High reliability in temperature shock test and at +176 °F (+85 °C)/85 % air humidity
- High ion purity (Na^+, K^+, Cl^- < 10 ppm)
- Option of postcuring from +266 °F (+130 °C), for example during lamination



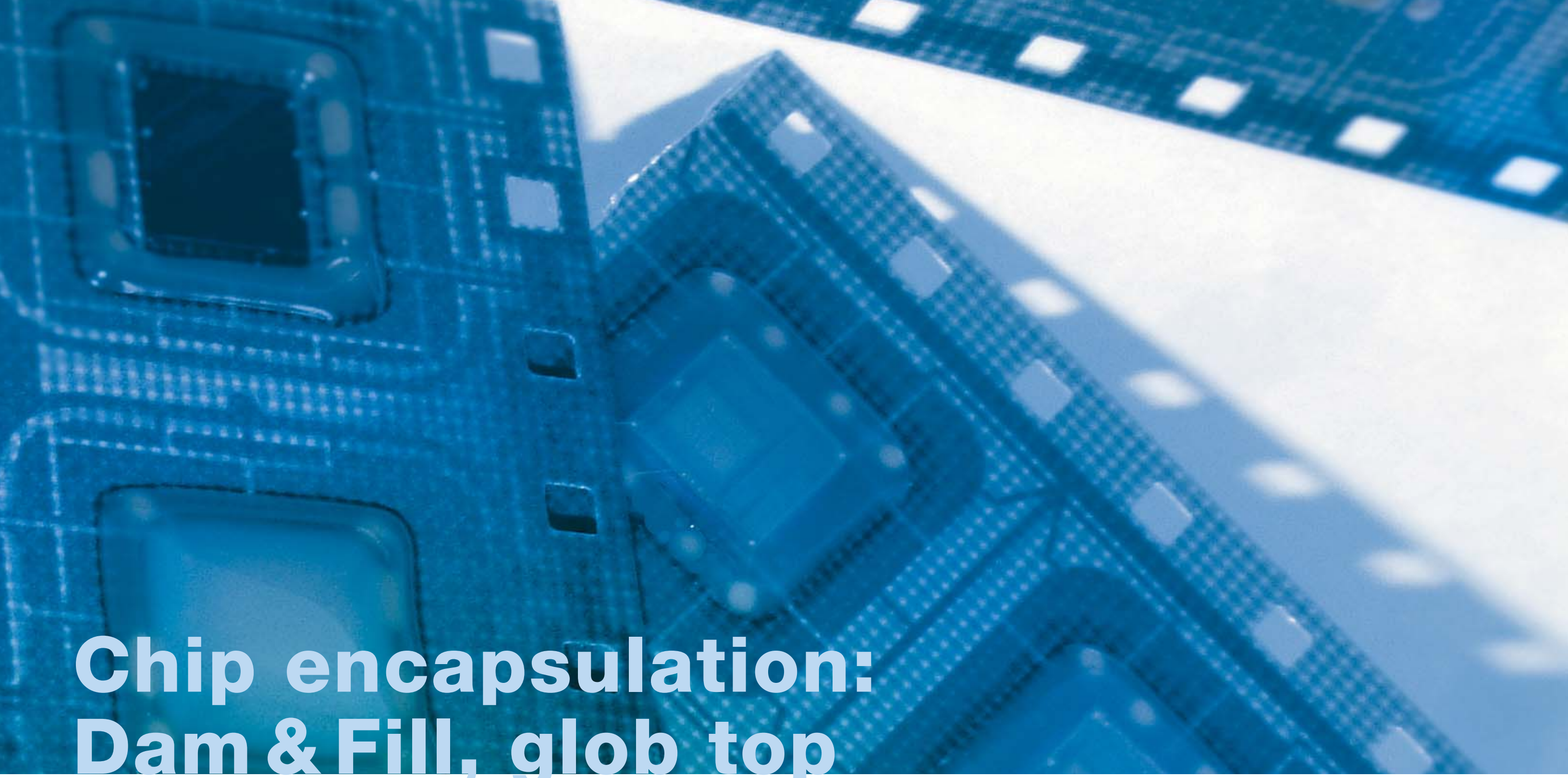
Principle of anisotropic conductive adhesive

	DELO® MONOPOX	
	AC268	**DA255**
Color*	black	gray
ACA/NCA	conductive	non-conductive
Adhesion to substrates**	very good strength on ceramic, metal, plastic, especially on PET, FR4, Cu, Al, Ag	very good strength on FR4, gold, pre-plated leadframe, Al, and LCP
Special features	fast-curing epoxy extended reliability	fast-curing epoxy extended reliability
Halogen-free	halogen-free by the criteria of IEC 61249-2-21	halogen-free according to IEC 61249-2-21

AC = **A**nisotropic **C**onductive   **DA** = **D**ie **A**ttach

* black products possible on request

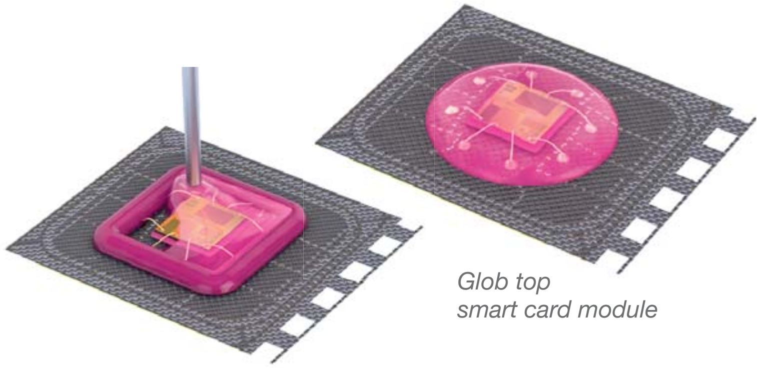
** for detailed information and more substrates please refer to the technical data sheet



Chip encapsulation: Dam & Fill, glob top

UV-curing DELO® KATIOBOND® adhesives

- Curing in seconds allows for short cycle times
- UV-curing in the wavelength range of 320 – 380 nm (see page 10)
- High ion purity
- Minimal casting height allows for the thinnest possible laminations
- Dam & Fill adhesives form a chemically homogeneous unit
- Depending on the requirement profile, tension-equalizing and hard products are available
- Excellent mechanical protection
- High reliability, even beyond the typically required levels

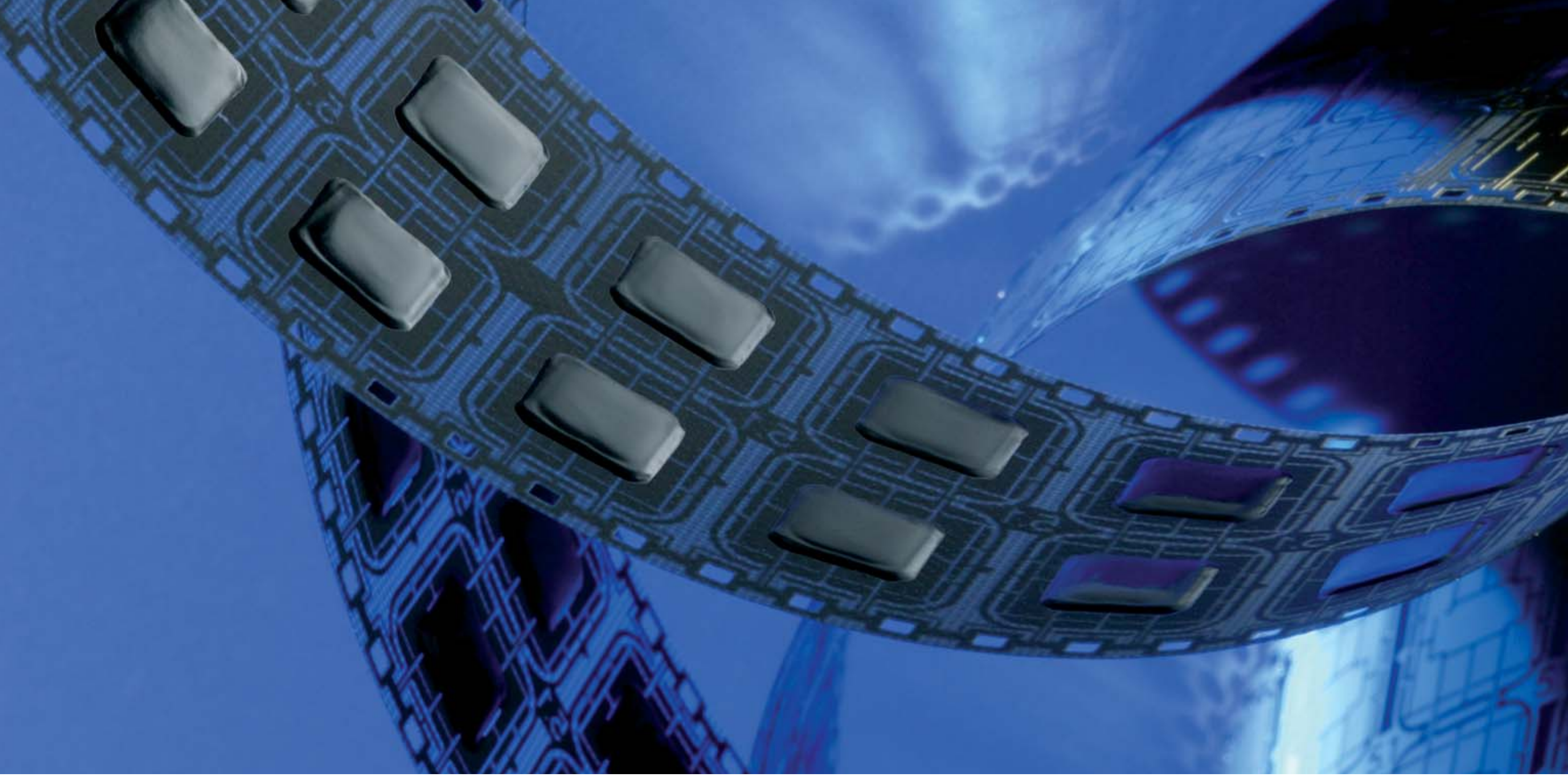


Glob top smart card module

Dam & Fill smart card module. The circumferential, high-viscous dam encloses the low-viscous fill

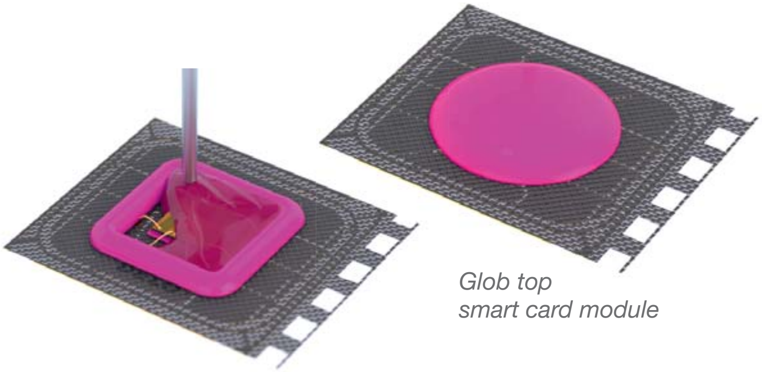
	DELO® KATIOBOND® DF6982 / DF6958	DELO® KATIOBOND® 4670 / DF698	DELO® KATIOBOND® 4668 / KB694
Curing	UV-curing (see page 10)	UV-curing (see page 10)	UV-curing (see page 10)
Target markets	Dam & Fill very high reliability	Dam & Fill glob top very high reliability	Dam & Fill very high reliability
Color	light-gray	light-gray translucent	light-gray translucent
Elasticity	tough-hard	tough-elastic	hard
Special features	ideal for high mechanical stress	worldwide popular standard encapsulant	hard standard product
Halogen-free	halogen-free according to IEC 61249-2-21	halogen-free according to IEC 61249-2-21	–

DF = **D**am & **F**ill **KB** = **K**ATIO**B**OND



Opaque, heat-curing DELO® DAM&FILL® adhesives

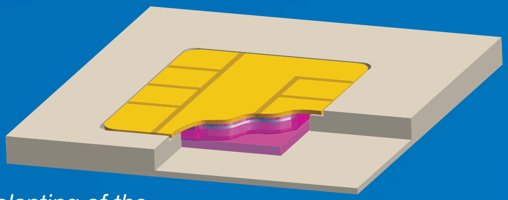
- Opaque in the VIS, UV and near IR range, in thin layers
- Increased copy protection by opaque encapsulation
- Short cycle times, curing in seconds
- Suitable for standard plans with heating bars
- Curing: only with heat by heating bars
- Good flow properties for flat encapsulation
- Mold-like mechanical protection



Glob top smart card module

Dam & Fill smart card module. The circumferential, high-viscous dam encloses the low-viscous fill

	DELO® DAM&FILL®
Curing	heat-curing MB capable
Target markets	Dam & Fill glob top highest mechanical protection highest reliability
Color	black (opaque)
Elasticity	hard
Special features	mold-like protection opaque UV / VIS / NIR FIPS compliant highest chemical reliability
Halogen-free	HALOGEN FREE ✓ halogen-free according to IEC 61249-2-21



Implanting of the chip module within the open time. The adhesive reinforces the thin rear wall and increases the stability of the card.

Adhesive for gap filling and bonding between card body and module

Filling of the gap between card body and module with DELO® KATIOBOND®

- Minimization of sink marks
- Reinforcement of the thin rear wall of the cavity
- Improvement of the printability in the chip area
- Curing by preactivation with visible light in 0.5 to 1 s
- Reliable curing until final strength at room temperature
- Ideal compatibility with DELO®'s Dam & Fill adhesives

Increase strength of the module in the card body with DELO-DUOPOX®

- The removal of the module from the card is made almost impossible
- Fulfillment of high safety standards of the card
- Reliable curing at room temperature
- Additional minimization of sink marks

	DELO® KATIOBOND®	DELO-DUOPOX®
Curing	preactivation with visible light	at room temperature
Color	brown milky	product-specific
Components	one	two
Elasticity	tough-elastic	tough-elastic
Application	sealing minimization of sink marks	in addition to embedding protection against manipulation makes the removal of the module from the card more difficult

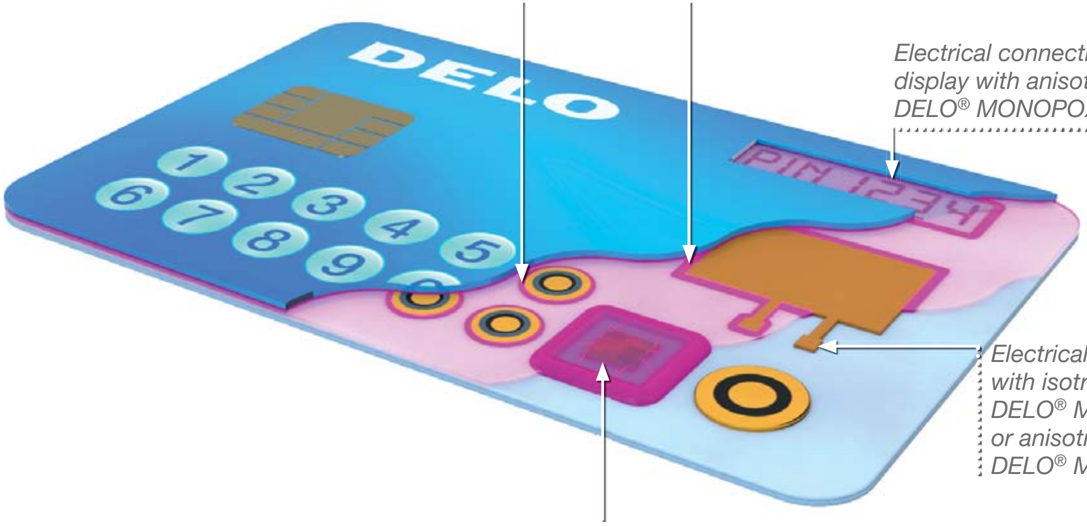
AD = **AD**hesive

Application: Display smart card

The right DELO® adhesive for any application

Display cards are multi-purpose cards with special functions and a particularly high safety standard.
They are equipped with a keyboard and a display, e. g., showing an on-time password when pressing the key.

Application areas include web payment, home banking and external access to company networks.



Gap filling and leveling with flexible, low-temperature-curing DELO® MONOPOX adhesive or the room-temperature-curing DELO-DUOPOX® adhesive

Electrical connecting of flexible display with anisotropically conductive DELO® MONOPOX AC adhesive

Electrical connection of the battery with isotropically conductive DELO® MONOPOX IC adhesive or anisotropically conductive DELO® MONOPOX AC adhesive

Encapsulation of chip with hard, bending-resistant DELO® DAM&FILL® encapsulant

AC = **A**nisotropic **C**onductive
AD = **AD**hesive
DF = **D**am & **F**ill
IC = **I**sotropic **C**onductive

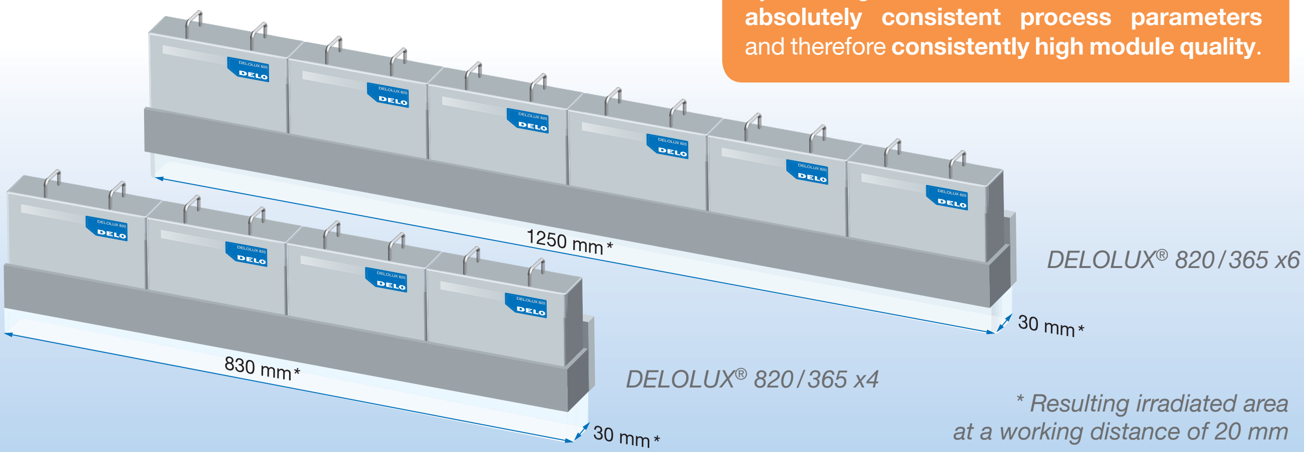
LED curing lamp for chip encapsulants

DELOLUX® 820 / 365: Innovative LED lamp for consistently high module quality

The DELOLUX® 820 curing lamp allows fast and even curing of DELO® KATIOBOND® Dam & Fill and glob top adhesives. This new lamp provides maximum power immediately after switched on and delivers consistent process parameters over a typical lifetime of more than 20,000 hours.

- Modular array of 4 or 6 individually controlled lamp heads
  - Maximum output in in-line processes
  - Easy-to-exchange lamp head
- Optimized light exit area
  - Evenly distributed intensity and homogeneous curing over the entire irradiation line
- Compact design
  - Easy integration into production systems
  - Compatible with existing fully automated encapsulation processes with UV-curing Dam & Fill and glob top materials
- Liquid cooling with external cooling unit
  - Stable light power at a constant temperature for maximum process reliability
  - Use in clean rooms

An LED light source with steady intensity in combination with a defined heat input by heating bars from the bottom enables **absolutely consistent process parameters** and therefore **consistently high module quality**.



DELOLUX® 820 / 365 x6

DELOLUX® 820 / 365 x4

** Resulting irradiated area at a working distance of 20 mm*

Chip encapsulation process at Mühlbauer and ruhlamat

In the production of chip modules for smart cards, the contacted chip is first encircled by a high-viscous adhesive (dam), that is subsequently filled with a low-viscous chip encapsulant (fill).
The adhesive can be applied with systems provided by Mühlbauer or ruhlamat.

Mühlbauer
High Tech International

YouTube
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ruhlamat
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solutions for your needs.

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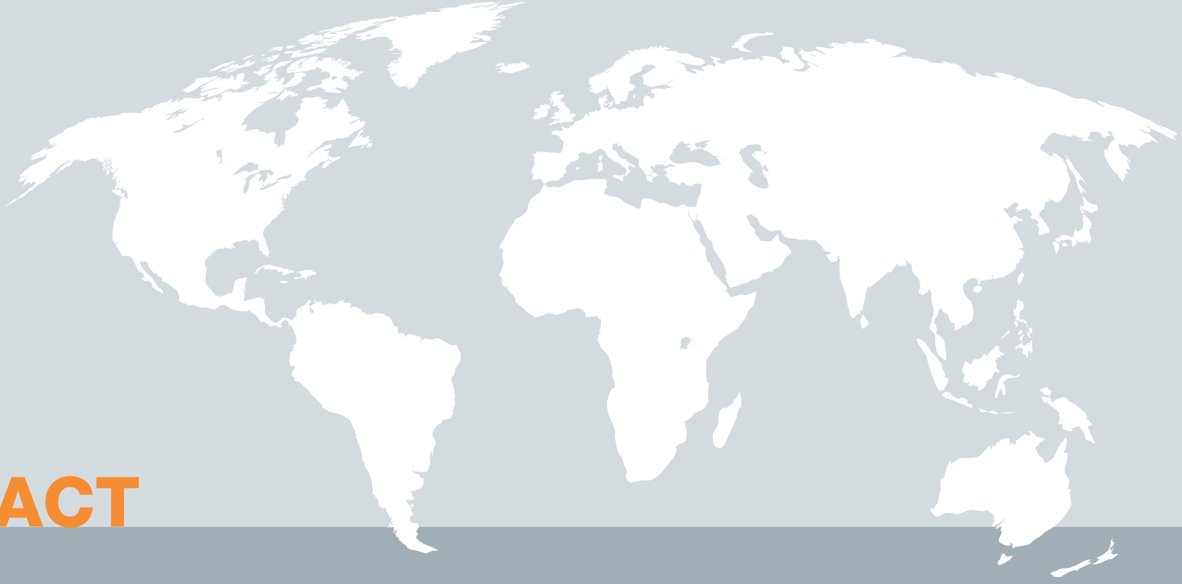

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- **Thailand** · Bangkok
- **USA** · Sudbury, MA

www.DELO-adhesives.com

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